OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS

A THESIS SUBMITTED TO

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT (PUNJAB)

IN THE PARTIAL FULFILLMENT

FOR THE AWARD OF DEGREE OF

MASTER IN SURGERY

IN

ORTHOPEDICS

MAY 2022

Submitted By

DR KHUSHWINDER SINGH

DEPARTMENT OF ORTHOPEDICS
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA, PUNJAB

DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled "**OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS**" submitted towards partial fulfillment of the requirements for the award of **MS in Orthopedics** degree to BFUHS is a compilation of original work carried out by me under the supervision of **Dr. Pankaj Mahindra**, Professor, Department of Orthopedics, **Dr. Gurpreet Singh Wander,** Professor & Head, Department of Cardiology and **Dr. Rajnish Garg**, Professor & Head, Department Orthopedics. No part of this thesis has formed the basis for the award of any degree previously.

_____

Dr. Khushwinder Singh
Department of Orthopedics,
Dayanand Medical College & Hospital,
Ludhiana, Punjab

Date:

Place:

CERTIFICATE OF SUPERVISORS

This is to certify that the work incorporated in this thesis entitled "**OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS"** has been carried out by **Dr. Khushwinder Singh** under our direct supervision. The data incorporated in this thesis is original and genuine and has been carried out by the candidate himself.

Signature of Supervisor

Dr. Pankaj Mahindra
Professor
Department of Orthopedics
DMC&H, Ludhiana

Signature of Co-Supervisors

Dr Gurpreet Singh Wander
Professor & Head
Department of Cardiology
DMC&H, Ludhiana

Dr. Rajnish Garg
Professor & Head
Department of Orthopedics
DMC&H, Ludhiana

Date:

ENDORSEMENT BY THE HEAD OF THE INSTITUTE

This is to certify that the thesis entitled "**OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS"** is a bonafide research work done by **Dr Khushwinder Singh** under the supervision of **Dr. Pankaj Mahindra**, Professor, **Dr. Gurpreet Singh Wander,** Professor & Head, Department of Cardiology and **Dr. Rajnish Garg**, Professor & Head, Department Orthopedics in this institution.

Principal

Dr. Sandeep Puri
Principal
DMC&H, Ludhiana

Date:

COPYRIGHT

Declaration by the Candidate

I hereby declare that the Baba Farid University of Health Sciences, Faridkot, shall have the rights to preserve & use this thesis in print or electronic format for academic/study purpose by the research scholar/students.

Signature

Dr Khushwinder Singh
Department of Orthopedics,
Dayanand Medical College & Hospital,
Ludhiana, Punjab - 141001

Date:

© Baba Farid University of Health Sciences, Faridkot

Dedicated

to

my Family,

friends

&

Teachers

ACKNOWLEDGEMENT

As I sit down to pen the conclusion to this thesis, memories flash in my mind and fill my heart with immense gratitude towards all those who, with their unending support and encouragement, have contributed in its successful completion and made this an unforgettable experience for me. At the onset of such major task, difficulties seemed insurmountable. I am highly grateful to the Almighty for enlightening the path and being the guiding force through all ups and downs in this journey.

I would like to express the deepest appreciation to my supervisor and mentor, Dr. Pankaj Mahindra (Professor, Department of Orthopaedics, DMC&H, Ludhiana), who has the attitude and the substance of a genius: he continually and convincingly conveyed a spirit of adventure in research and an excitement in regard to teaching. I take great pride in expressing my gratitude to him. He has always been an epitome of excellence for me. This thesis would have remained a dream had it not been for the scholarly

guidance and constant encouragement of my co-supervisor, **Dr. Rajnish Garg** (Professor and Head, Department of Orthopedics DMC&H, Ludhiana) and **Dr. Gurpreet Singh Wander** (Professor and Head, Department of Cardiology) With great reverence and profound pleasure, I acknowledge his indelible help and fervent interest at all stages of this project, which helped in making it a success.

I convey my sincerest thanks to my teachers **Dr.Harpal Singh Selhi, Dr.Deepak Jain, Dr. Shekhar Singhal** and **Dr. Anubhav Sharma** for their constant encouragement and kind support.

I thank my colleagues, **Dr. Gobinder Singh , Dr. Vaibhav bohat , Dr. Paramjeet Singh , Dr. Aamna Atwal , Dr . Amol Rattan , Dr . Nitish Khosla , Dr. Tushar Singla , Dr. Sahil Singla , Dr. Udit Vyas , Dr. Ramandeep Singh , Dr. Manvinder Singh , Dr. Guryodh Sidhu , Dr. Tushar Jethi , Dr. Sahil Sahota , Dr. Malwinder Singh , Dr. Avi Badhan** at DMC&H, Ludhiana for being generous companions. They have been an invaluable support day in and day out.

Words fail miserably as I express my gratitude to my parents and parent in laws for all their love and affection, selflessness, numerous sacrifices, unfaltering attention to my needs and unparalleled determination in striving to make me what I am today.

I owe a big thanks to my better half , **Dr. Karanjot Kaur** who stood by me at every step of my life and whose incessant support and encouragement, patience and unwavering faith have helped me sail through testing waters undeterred.

I bow my head in sincerely acknowledging all my patients who consented to become the subjects of this thesis. Without their cooperation, this study would not have seen the light of the day.

A special thanks to **Mr. Tarun Sharma , Ms. Neha Bhatt, Mr. Gurinder Singh, Mrs. Namita Bansal & whole team** at Research & Development Centre, DMC&H, Ludhiana for their sincere efforts in a fine reproduction of this work.

Dr. Khushwinder Singh....

ABBREVATIONS

AO	Arbeitsgemeinschaft für Osteosynthesefragen
ACC	American college of cardiology
AHA	American Heart association
AKI	Acute Kidney Injury
CHS	compression hip screw
CKD	Chronic kidney disease
CVD	Cardiovascular disease
DM	Diabetes Mellitus
DHS	dynamic hip screw
CI	Confidence Intervals
ECG	echo cardiograph
HTN	Hypertension
HHS	Harris Hip score
IT	Intertrochanteric
IHD	Ischaemic heart disease
LISS	less invasive stabilization system
NOAC	new oral anticoagulants
NSAID	Non-Steroidal Anti Inflammatory Drugs
PCCP	percutaneous compression plate
PPM	Parker Parmer Mobility
PFN	Proximal Femur Nail
RR	Rate ratio
SD	standard deviation
TAD	tip apex distance
UTI	Urinary tract infection

ABSTRACT

Introduction: Proximal femur fractures correspond to a large percentage of hospitalisations due to orthopaedic conditions, and are associated with high morbidity and mortality rates. One of the most commonly occurring bone injuries among the elderly is the intertrochantric fracture of the femur. Hip fracture, as a serious consequence of osteoporosis, has been associated with multiple comorbidities including cardiovascular disease among older adults .

Aims and objectives: To assess the outcome of fracture in patients with cardiac conditions, evaluate delay in surgery & study quality of life post hospital discharge.

Materials & methods: A prospective review of the medical records of 32 cases who underwent surgery at Dayanand Medical college Hospital, Ludhiana was performed. Patients were selected with proximal femur fracture with cardiac conditions after fulfilling the inclusion and exclusion criteria. After taking detailed history and examination , the patients were followed up after 4-6 weeks and 3-4 months. A detailed structured performa was filled and functional assessment was done using HHS .

Result: We had final follow up of all 32 patients which were included in the study. Modified HHS was accessed at 4-6 weeks and 3- 4 months and found to be 41.19 (SD =12.89) & 64.66 (SD =13.35) respectively. No mortality was observed during the follow up. Presence of cardiac comorbidities increased the chances of hip fracture and poor HHS was observed among the patients in the study. Although no significant difference on HHS was observed among the subtypes of cardiac disease. Most common cause of delay in surgery was due to anti-platelet agents and delay in surgery affected the HHS significantly in a way that more the delay, poor is the HHS. Presence of comorbidities like hypertension, diabetes mellitus decreased the mean HHS. Occurrence of complications also affected the HHS. More the complications, poor is the HHS.

Conclusion: Patients with hip fracture with a diagnosis of CVD, have greater risk of hip fracture with longer length of hospital stay and hence higher cost per hospital stay. Presence of more comorbidities along with CVD shows a significant association in the functional outcome.

Keywords: Proximal femur fracture, cardiovascular disease, intertrochantric fracture , Harris hip score (HHS)

TABLE OF CONTENTS

S. NO.	TOPIC	PAGES
I	INTRODUCTION	1-11
II	AIMS AND OBJECTIVES	12
III	REVIEW OF LITERATURE	13-23
IV	MATERIALS AND METHODS	24-28
V	OBSERVATIONS AND RESULTS	29-63
VI	DISCUSSION	64-68
VII	SUMMARY AND CONCLUSIONS	69-75
VIII	BIBLIOGRAPHY	76-84
	APPENDICES – I - PROFORMA - MASTER CHART	
	APPENDICES – II - APPROVAL LETTER OF THESIS PLAN - THESIS PLAN	

LIST OF TABLES

Table No.	Title	Page No.
1.	THE AMERICAN COLLEGE OF CARDIOLOGY/AMERICAN HEART ASSOCIATION CLINICAL PREDICTORS FOR EACH RISK GROUP	19
2.	MODIFIED HARRIS HIP SCORE.	27
3.	DISTRIBUTION OF AGE OF STUDY SUBJECTS	29
4.	DISTRIBUTION OF GENDER OF STUDY SUBJECTS	30
5.	DISTRIBUTION OF MODE OF INJURY OF STUDY SUBJECTS	31
6.	DISTRIBUTION OF BOYD & GRIFFIN CLASSIFICATION AMONG THE SUBJECTS	32
7.	DISTRIBUTION OF SUBJECTS WITH HYPERTENSION	33
8.	DISTRIBUTION OF SUBJECTS WITH H/O DIABETES MELLITUS TYPE-II	34
9.	DISTRIBUTION OF COMORBIDITIES AMONG THE SUBJECTS.	35
10.	DISTRIBUTION OF IHD AMONG THE SUBJECTS	36
11.	DISTRIBUTION OF SUBJECTS WHO HAVE TAKEN ANTI-PLATELET AGENTS BEFORE ADMISSION	37
12.	DISTRIBUTION OF SUBJECTS WHOSE HOSPITAL STAY WAS PROLONGED	38
13.	DISTRIBUTION OF TIME PERIOD DELAY IN OPERATION AMONG SUBJECTS	39
14.	DISTRIBUTION OF CAUSE OF DELAY IN SUBJECTS UNDERGOING SURGERY	40
15.	DISTRIBUTION OF ECHO FINDINGS (Ejection Fraction) AMONG THE SUBJECTS	41
16.	DISTRIBUTION OF PERIOPERATIVE COMPLICATIONS AMONG THE SUBJECTS	42
17.	DISTRIBUTION OF IMMEDIATE POST-OP COMPLICATIONS AMONG THE SUBJECTS	43

18.	DISTRIBUTION OF LATE POST-OP COMPLICATIONS AMONG THE SUBJECTS	44
19.	DISTRIBUTION OF HARRIS HIP SCORE AMONG THE SUBJECTS AT 4-6 WEEKS	45
20.	DISTRIBUTION OF HARRIS HIP SCORE AMONG THE SUBJECTS AT 3-4 MONTHS	46
21.	DISTRIBUTION OF HHS AT 4-6 WEEKS & 3-4 MONTHS	47
22.	RELATIONSHIP BETWEEN HARRIS HIP SCORE AND THE GENDER OF THE SUBJECTS AT DIFFERENT TIMELINES	48
23.	RELATIONSHIP BETWEEN HHS AND DIABETES MELLITUS TYPE-II AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	49
24.	RELATIONSHIP BETWEEN HHS AND HYPERTENSION AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	50
25.	RELATIONSHIP BETWEEN HHS AND OTHER COMORBIDITIES AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	51
26.	RELATIONSHIP BETWEEN HHS AND CKD AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	52
27.	RELATIONSHIP BETWEEN HHS AND PERIOPERATIVE COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	53
28.	RELATIONSHIP BETWEEN HHS AND IMMEDIATE POST-OP COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	54
29.	RELATIONSHIP BETWEEN HHS AND LATE POST OP COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	55
30.	RELATIONSHIP BETWEEN HHS & AGE AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	56
31.	RELATIONSHIP BETWEEN HHS & DELAY IN SURGERY AT 4-6 WEEKS & 3-4 MONTHS	58

32.	RELATIONSHIP BETWEEN HHS & IHD AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	60
33.	RELATIONSHIP BETWEEN HHS & EJECTION FRACTION AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	62

LIST OF FIGURES

Fig. No.	Title	Page No.
1.	DISTRIBUTION OF AGE OF STUDY SUBJECTS	29
2.	DISTRIBUTION OF GENDER OF STUDY SUBJECTS	30
3.	DISTRIBUTION OF MODE OF INJURY OF STUDY SUBJECTS	31
4.	DISTRIBUTION OF BOYD & GRIFFIN CLASSIFICATION AMONG THE SUBJECTS	32
5.	DISTRIBUTION OF SUBJECTS WITH HYPERTENSION	33
6.	DISTRIBUTION OF SUBJECTS WITH H/O DIABETES MELLITUS TYPE-II	34
7.	DISTRIBUTION OF COMORBIDITIES AMONG THE SUBJECTS.	35
8.	DISTRIBUTION OF IHD AMONG THE SUBJECTS	36
9.	DISTRIBUTION OF SUBJECTS WHO HAVE TAKEN ANTI-PLATELET AGENTS BEFORE ADMISSION	37
10.	DISTRIBUTION OF SUBJECTS WHOSE HOSPITAL STAY WAS PROLONGED	38
11.	DISTRIBUTION OF TIME PERIOD DELAY IN OPERATION AMONG SUBJECTS	39
12.	DISTRIBUTION OF CAUSE OF DELAY IN SUBJECTS UNDERGOING SURGERY	40
13.	DISTRIBUTION OF ECHO FINDINGS (Ejection Fraction) AMONG THE SUBJECTS	41
14.	DISTRIBUTION OF PERIOPERATIVE COMPLICATIONS AMONG THE SUBJECTS	42
15.	DISTRIBUTION OF IMMEDIATE POST-OP COMPLICATIONS AMONG THE SUBJECTS	43
16.	DISTRIBUTION OF LATE POST-OP COMPLICATIONS AMONG THE SUBJECTS	44
17.	DISTRIBUTION OF HARRIS HIP SCORE AMONG THE	45

	SUBJECTS AT 4-6 WEEKS	
18.	DISTRIBUTION OF HARRIS HIP SCORE AMONG THE SUBJECTS AT 3-4 MONTHS	46
19.	DISTRIBUTION OF HHS AT 4-6 WEEKS & 3-4 MONTHS	47
20.	RELATIONSHIP BETWEEN HARRIS HIP SCORE AND THE GENDER OF THE SUBJECTS AT DIFFERENT TIMELINES	48
21.	RELATIONSHIP BETWEEN HHS AND DIABETES MELLITUS TYPE-II AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	49
22.	RELATIONSHIP BETWEEN HHS AND HYPERTENSION AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	50
23.	RELATIONSHIP BETWEEN HHS AND OTHER COMORBIDITIES AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	51
24.	RELATIONSHIP BETWEEN HHS AND CKD AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	52
25.	RELATIONSHIP BETWEEN HHS AND PERIOPERATIVE COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	53
26.	RELATIONSHIP BETWEEN HHS AND IMMEDIATE POST-OP COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	54
27.	RELATIONSHIP BETWEEN HHS AND LATE POST OP COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	55
28.	RELATIONSHIP BETWEEN HHS & AGE AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	57
29.	RELATIONSHIP BETWEEN HHS & DELAY IN SURGERY AT 4-6 WEEKS & 3-4 MONTHS	59
30.	RELATIONSHIP BETWEEN HHS & IHD AMONG THE	61

	SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	
31.	RELATIONSHIP BETWEEN HHS & EJECTION FRACTION AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS	63

LIST OF PICTURES

Picture No	Title
1	EVANS CLASSIFICATION
2	JENSEN'S MODIFICATION OF THE EVANS CLASSIFICATION
3	KYLE'S CLASSIFICATION
4	BOYD AND GRIFFIN CLASSIFICATION
5	ANATOMY OF PROXIMAL FEMUR
6	BLOOD SUPPLY OF PROXIMAL FEMUR
7	CASE 1 - PREOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW
8	CASE 1 - POSTOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW
9	CASE 1 - FOLLOW UP XRAYS AFTER 4 WEEKS ANTEROPOSTERIOR AND LATERAL VIEW
10	CASE 1 - FOLLOW UP XRAYS AFTER 4 MONTHS ANTEROPOSTERIOR AND LATERAL VIEW
11	CASE 2 - PREOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW
12	CASE 2 - POSTOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW
13	CASE 2 - FOLLOW UP XRAYS AFTER 4 WEEKS ANTEROPOSTERIOR AND LATERAL VIEW
14	CASE 2 - FOLLOW UP XRAYS AFTER 4 MONTHS ANTEROPOSTERIOR AND LATERAL VIEW
15	CASE 3 - PREOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW

16	CASE 3 - POSTOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW
17	CASE 3 - FOLLOW UP XRAYS AFTER 4 WEEKS ANTEROPOSTERIOR AND LATERAL VIEW
18	CASE 3 - FOLLOW UP XRAYS AFTER 4 MONTHS ANTEROPOSTERIOR AND LATERAL VIEW
19	CASE 4 - PREOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW
20	CASE 4 - POSTOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW
21	CASE 4 - FOLLOW UP XRAYS AFTER 4 WEEKS ANTEROPOSTERIOR AND LATERAL VIEW
22	CASE 4 - FOLLOW UP XRAYS AFTER 4 MONTHS ANTEROPOSTERIOR AND LATERAL VIEW

INTRODUCTION

Proximal femur fractures correspond to a large percentage of hospitalisations due to orthopaedic conditions, and are associated with high morbidity and mortality rates. It is estimated that the number of cases can reach up to 6.26 million by 2050, mostly because of the population pyramid inversion worldwide. The affected patients are usually older than 70 years of age, Caucasian and postmenopausal females. The most common mechanism is low-energy trauma, and it is related to clinical conditions such as malnutrition, decreased visual acuity and reflexes, chronic use of medications, and, most importantly, the progressive decrease in bone mineral density[1].

One of the most commonly occurring bone injuries among the elderly is the intertrochantric fracture of the femur[2]. Ageing is an undefinable process and as the population ages, the incidence of hip fracture is anticipated to increase exponentially. Prolonged bed rest further worsens the morbidity and mortality after a hip fracture. Thus the early restoration of the patients to their pre-injury status is imperative and this entailed internal fixation should be accepted as the standard of management as it provides acceptable reduction and facilitates early[3].

The quality of internal fixation is significantly affected by factors such as intrinsic factors like osteoporosis and fracture comminution as well as by extrinsic factors like the quality of reduction, the type of implant and the insertion techniques[4,5].

Ninety percent of intertrochanteric fractures occur through osteoporotic bone due to simple fall, whereas in young individuals, it may be a result of high-energy injuries such as motor vehicle accidents or fall from height.

Unstable intertrochanteric fractures needs to be differentiated from their stable counterparts with regards to treatment plan and prognosis.

Risk factors for unstable intertrochanteric fractures include:

1. Loss of medial buttress.
2. Reverse obliquity fractures
3. Severe comminution

4. Subtrochantric extension of fracture
5. Shattered lateral wall
6. Extension into neck area
7. Severe osteoporosis (singh index <3) [6]

EPIDEMIOLOGY OF PROXIMAL FEMORAL FRACTURES

Between 220,000 and 250,000 proximal femoral fractures occur in the United States each year; 90% of these fractures occur in patients older than 50 years. In younger patients, proximal femoral fractures are usually the result of high-energy physical trauma (eg, high speed motor vehicle accidents) and usually occur in the absence of disease. Intertrochanteric and femoral neck fractures account for 90% of the proximal femoral fractures occurring in elderly patients.[7,8] Proximal femoral fractures in elderly patients are often pathologic, usually resulting from minimal-to-moderate physical trauma to the areas of bone significantly affected by osteoporosis. However, pathologic fractures can occur at any age; typically, these fractures result from low-energy injuries and may be characterized by unusual fracture patterns.[9]

The incidence of proximal femoral fractures among females is 2 to 3 times higher than the incidence of such fractures among males. Also, the risk of sustaining a proximal femoral fracture doubles every 10 years after age 50 years.[7] Other risk factors for proximal femoral fractures include osteoporosis, a maternal history of hip fractures[10], excessive alcohol consumption, high caffeine intake[11], physical inactivity[12], low body weight[13], previous hip fracture[14],the use of certain psychotropic medications[15], visual impairment[10], dementia[16], residence in an institution[17], and smoking[18]. Frequent fractures of proximal femur are intertrochanteric fractures which involve upper end of femur between both trochanters with or without extending into the upper femoral shaft[19] occuring commonly in geriatric patients. Since general life expectancy of population has increased in the past two decades incidence of fractures of proximal femur are also increasing. In 1990 of overall hip fractures 26% occurred in Asia. This is expected to rise upto 37% in 2025 and 45% in 2050[20,21] Only moderate or

minimal trauma is enough to cause proximal femur fractures in geriatric patients. Simple self fall causes intertrochanteric fractures in elderly people due to osteoporosis and increased incidence of self fall with increasing age is due to decreased muscle power, decreased reflexes, poor vision and labile blood pressure. In younger patients it requires high energy trauma. Intertrochanteric fracture line involves along extra capsular basilar neck region to region along the lesser trochanter, undisplaced fractures and fractures with intact postero-medial cortex are said to be stable[22]. Unstable contribute to about 50%-60% of all intertrochanteric fractures[23,24]. There are five variables described by Kaufer which are found to affect the biomechanics strength of the repair. Bone quality and fracture pattern which are surgeon independent along with Implant choice, quality of fracture reduction and positioning of implant which are surgeon dependent[25] Main weight bearing bone of lower limb is femur. Intertrochanteric fractures cause patients to be bedridden for prolonged period of time and they are more prone for urinary tract infection, respiratory tract infection, bed sores and joint stiffness etc. To avoid these complications operative treatment is indicated.

Hip fracture, as a serious consequence of osteoporosis, has been associated with multiple comorbidities including cardiovascular disease (CVD) among older adults[26–29]. The incidence rate of hip fracture was about 13 per 1000 person-year after a diagnosis of CVD during the 20 years of followup from the age of 50 years reported by a European study[26]. Researchers have suggested common etiologic mechanisms for CVD and hip fracture, two independent age-related disorders previously considered[26,30-33]. Bone mineralization and vascular calcification shared common pathologic pathways and medications, including cholesterol-lowering stains and bisphosphonates which have been shown to affect both atherosclerosis and osteoporotic fractures[26, 30, 31]. A large Swedish twin study suggested a genetic predisposition for both vascular and bone health[26]. Although this genetic explanation remains at large, specific attention has been devoted to hypertension, which is believed to predispose individuals not only to heart disease

and stroke but also to bone mineral loss[32, 33]. The associations of hip fracture with CVD were essentially derived from studies conducted in European populations.

INTERTROCHANTERIC FRACTURES

General Characteristics

Intertrochanteric fractures occur in the transitional bone between the femoral neck and the femoral shaft[34]. These fractures may involve both the greater and the lesser trochanters. Transitional bone is composed of cortical and trabecular bone. These bone types form the calcar femorale postero-medially, which provides the strength to distribute the stresses of weight bearing. Consequently, the stability of intertrochanteric fractures depends on the preservation of the posteromedial cortical buttress[35]. Osteonecrosis is uncommon because these fractures usually do not disturb the femoral head blood supply. Moreover, because transitional bone is highly vascular, complications such as non-unions are uncommon as well[34].

Classification[36]

The most often used classification system for intertrochanteric fractures is based on the stability of the fracture pattern and the ease in achieving a stable reduction.

Most classifications are based on these factors and help in selecting management protocols. Many classification systems have come from last 6 decades, but none of them are found to be unanimously acceptable worldwide. Few classifications have focussed on stability and anatomical pattern (Evans; Ramadier; Decoulx; & Lavarde) while others on maintaining reduction of various types (Jensen's modification of Evan's,Ender; Tronzo, AO). An ideal classification should be simple, reproducible, easy to apply and should provide information on stability after reduction, secondary displacement, technique of fixation, postoperative mobilisation, outcome, and also data organisation for research. It should have good interrater and intrarater reliability and validity.

Various classifications in Intertrochanteric fractures:

Evans Classification (Picture 1):

In 1949, Evans published his classification on intertrochanteric (IT) fractures as follows:

Type I:

Stable:

-Undisplaced fractures.

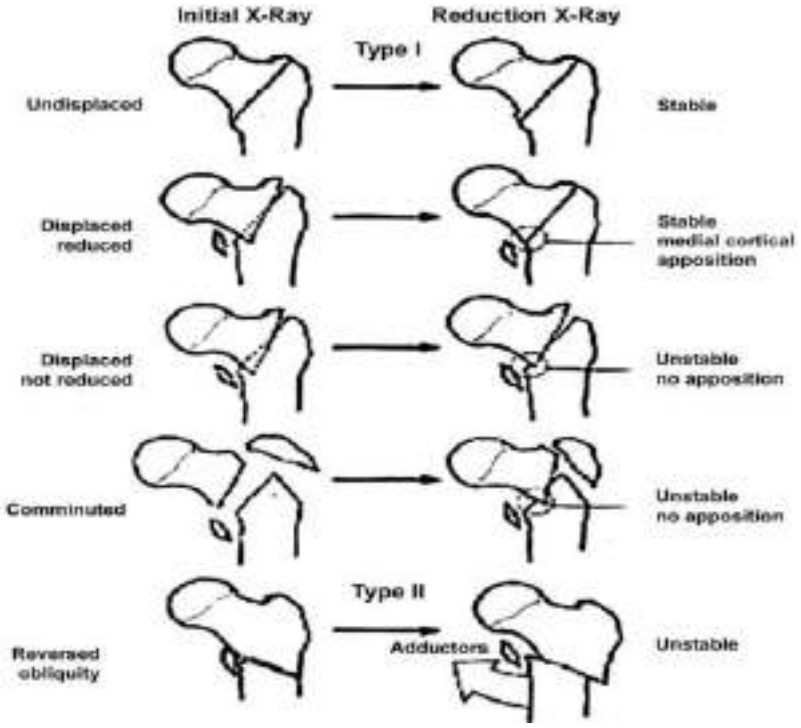
-Displaced but after reduction overlap of the medial cortical buttress make the fracture stable.

Unstable:

-Displaced and the medial cortical buttress is not restored by reduction of fracture.

-Displaced and comminuted fractures in which the medial cortical buttress is not restored by reduction of the fracture.

Type II: Reverse obliquity fractures.



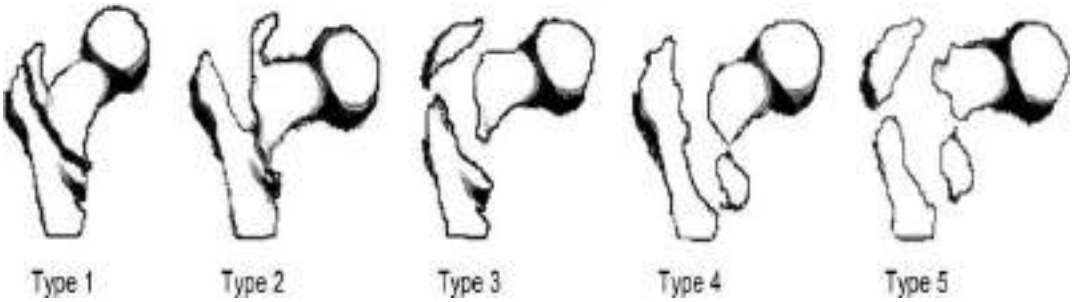
PICTURE 1: EVANS CLASSIFICATION

Clinical importance: This helped in better understanding of intertrochanteric fractures based on stability of fracture after close reduction and skeletal traction. According to Evans, posterior-medial cortex continuation is important for restoring stability of IT fractures. Based on this he classified IT fractures into Stable and Unstable

fractures. Stable fractures have intact or minimally communited postero-medial cortex, while unstable fracture has greater communition of postero-medial cortex. Unstable fractures after reduction can be converted to stable fracture if the postero-medial cortex opposition can be achieved. Reverse oblique pattern was considered inheritably unstable fracture as distal femur has tendency to drift medially due adductor pull.

Jensen's Modification of the Evans Classification (Picture. 2):

Jansen (1975) later modified Evans classification into three groups. Displaced or undisplaced stable 2-fragment fractures, Unstable 3-fragment fractures with greater or lesser trochanter fracture
and 4-fragment fractures.



PICTURE 2: JENSEN'S MODIFICATION OF THE EVANS CLASSIFICATION[37]

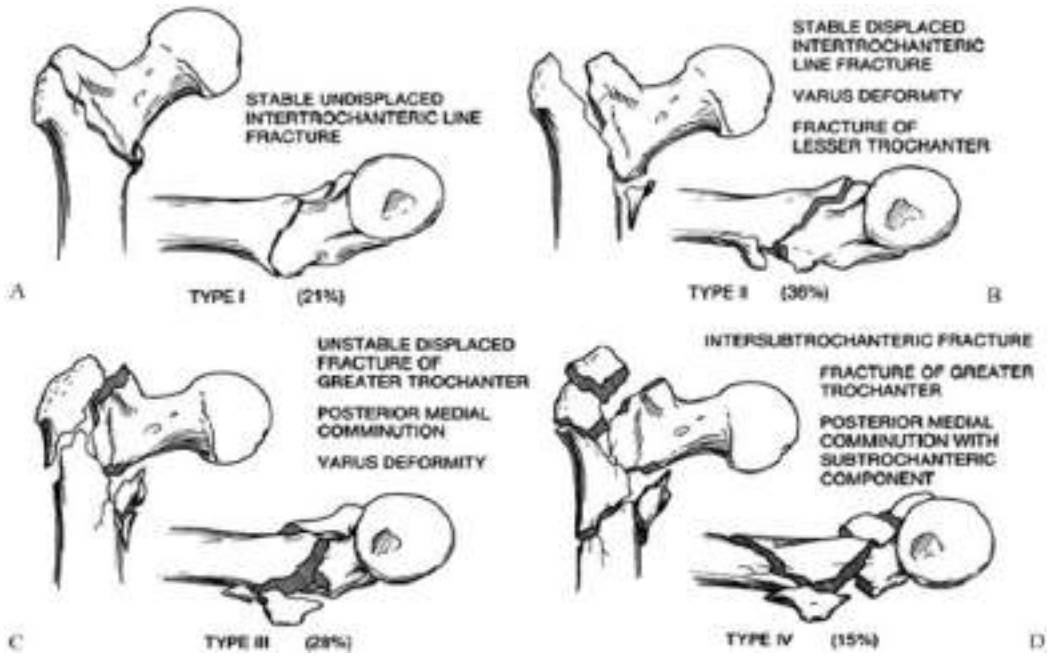
Clinical Importance: the classification reduced the number of types from 6 to 5 by including the extremely rare fracture with a reversed oblique fracture line and large greater trochanter fragment into Type 3. Modification of the Evans system offers the best prediction of the possibility of obtaining reliable anatomical reduction and the risk of secondary fracture dislocation.

Kyle's Classification (Picture. 3):

Type I fractures consist of non displaced stable intertrochanteric fractures without comminution.

Type II fractures represent stable, minimally comminuted but displaced

fractures; these are the fractures that, once reduced, allow a stable construct. Stable fractures are not a problem and hold up well with any type of fixation device.



PICTURE 3: KYLE'S CLASSIFICATION

Type III intertrochanteric fracture is a problem fracture and has a large postero-medial comminuted area.

Type IV fracture is uncommon and consists of an intertrochanteric fracture with a subtrochanteric component. This is the most difficult type of fracture to fix because of the great forces imposed by muscle forces and weight bearing on the subtrochanteric region of the femur.

Clinical Importance: Addition of new variant (type 4) extension of intertrochanteric fracture in neck.[36]

Boyd and Griffin Classification (1949) (Picture. 4):

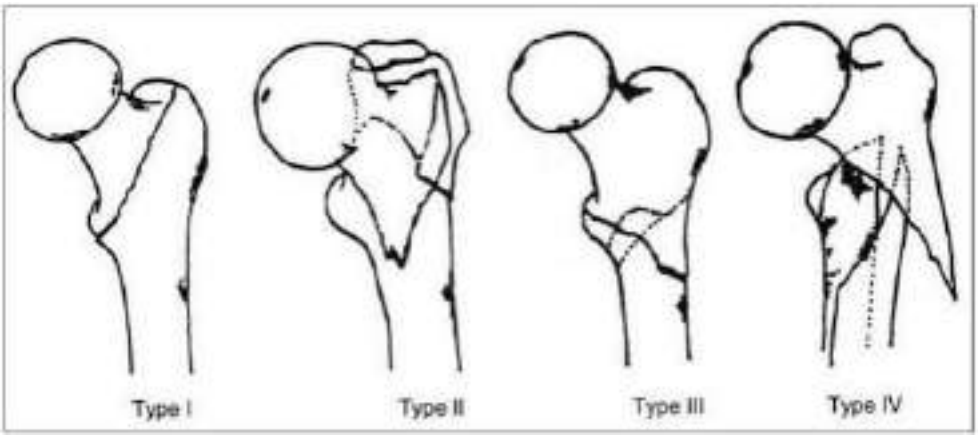
They were first to mention instability in both coronal and sagittal plane. This classification, included fractures from the extracapsular part of the neck to a point 5cm distal to the lesser trochanter.

Type 1: Fractures that extend along the intertrochanteric line.

Type 2: Comminuted fractures with the main fracture line along the intertrochanteric line but with multiple secondary fracture lines (may be in coronal plane).

Type 3: Fractures that extend to or are distal to the lesser trochanter.

Type 4: Fractures of the trochanteric region and proximal shaft with fractures in at least two planes.



PICTURE 4: BOYD AND GRIFFIN CLASSIFICATION[38]

Clinical importance:

Type 1- Reduction usually is simple and is maintained with little difficulty. Results generally are satisfactory

Type 2- Reduction of these fractures is more difficult because the comminution can vary from slight to extreme.

Type 3- these fractures usually are more difficult to reduce and result in more complications at operation and during convalescence.

Type 4- if open reduction and internal separation.

Clinical importance:

This system is complex to use & not adequate to apply in clinical practice. It has poor reliability, though can be used for documentation of long-term results and comparison of treatment modality. Yet many surgeons prefer it for its simplicity and biomechanical rationale[36].

ANATOMY[39]

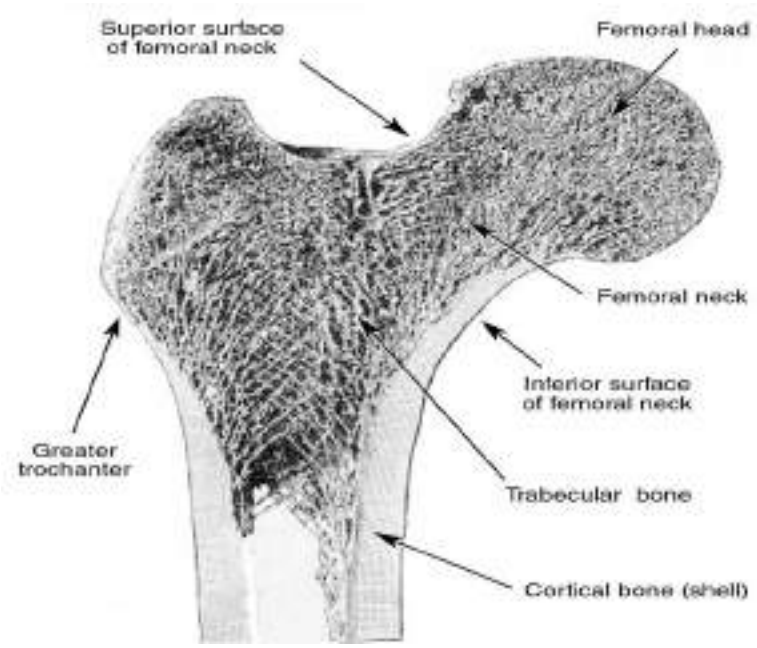
The longest and strongest bone of the body is femur. The parts of proximal end of femur are head, neck, greater trochanter, lesser trochanter, intertrochanteric line and intertrochanteric crest

Head of femur

Femoral head forms more than half of sphere, directed medially upwards and forwards and forms hip joint by articulating with acetabulam.

Neck of femur

Long axis of neck makes an angle of 125° to 135° with long axis of the shaft and is termed as neck shaft angle and angle of 10°-30° with frontal plane which is termed angle of femoral torsion/anteversion.



PICTURE 5: ANATOMY OF PROXIMAL FEMUR [39]

Calcar

Dense vertical plate of bone extending from the postero-medial portion of the femoral shaft under the lesser trochanter and radiating laterally to greater trochanter reinforcing the femoral neck postero-medialy. Calcar is thicker medially and thinner laterally.

Greater trochanter

A quadrangular prominence present at upper part of the junction between neck and shaft. This posterosuperior part projects upwards and medially beyond the level of neck. Most of the muscles of gluteal region are inserted into greater trochanter.

Lesser trochanter

Conical eminence directed medially and backwards and gives attachment to primary flexor of thigh, the ilo-psoas.

Intertrochanteric line

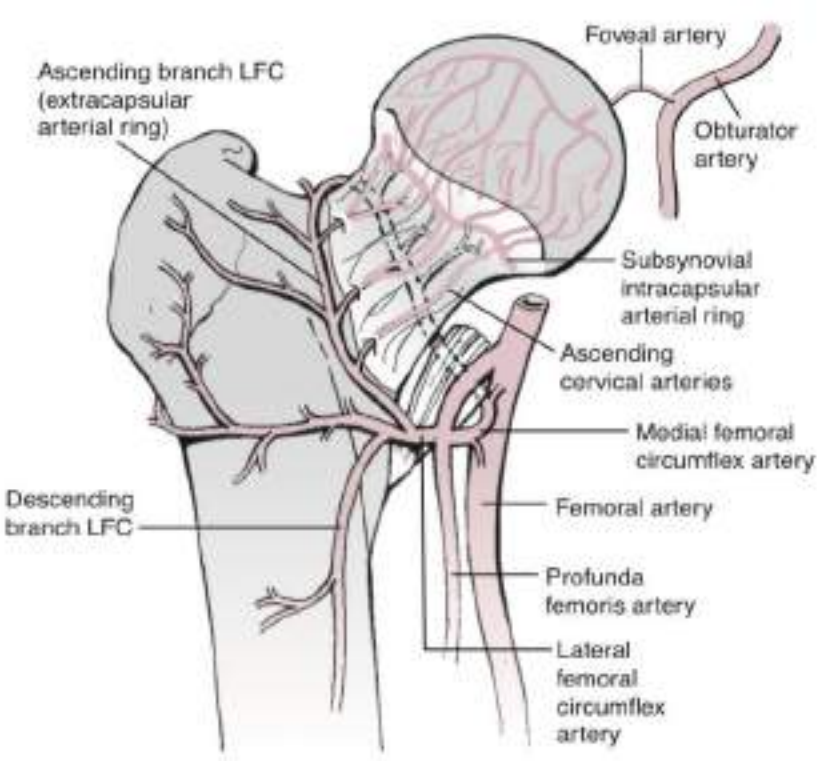
Prominent roughed ridge begins at antero-superior angle of greater trochanter continues with spiral line below. It marks the junction of anterior surface of neck with the shaft of femur.

Intertrochanteric crest

Smooth rounded ridge begins above the posterosuperior angle of greater trochanter and ends at lesser trochanter.

Intertrochanteric region

Area between greater and lesser trochanter characterized by dense trabecular bone serves to transmit and distribute stress.



PICTURE 6: BLOOD SUPPLY OF PROXIMAL FEMUR[40]

BLOOD SUPPLY

Blood supply to proximal end of femur is described into three major groups:

1. Extra capsular arterial ring at the base of neck of femur.

2. Reticular vessels by extra capsular arterial ring on the surface of femoral neck.
3. Arteries of round ligament.

The extra capsular arterial ring is formed posteriorly and anteriorly by branch of medial femoral circumflex artery and branch of lateral femoral circumflex artery, respectively. Reticular vessels or ascending cervical branches ascend on the surface of neck of femur in anterior, posterior, medial and lateral groups. Lateral group vessels are most important. These proximal vessels most vulnerable to injury in femoral neck fracture. Ascending cervical vessels forms a less distinct ring called sub synovial intra articular arterial ring, from this epiphyseal arteries penetrate the femoral head. Lateral epiphyseal arterial group being the most important supplies lateral weight bearing portion of femoral head.

In 1838 Ward described the trabecular system of proximal femur. Trabeculations arise along the lines of force to which bone exposes (Wolff's law)[40].

TREATMENT OPTIONS

There are several surgical methods to treat intertrochanteric fracture: dynamic hip screw (DHS), compression hip screw (CHS), percutaneous compression plate (PCCP), less invasive stabilization system (LISS), Gamma nail, proximal femoral nail (PFN) and hemiarthroplasty .Generally, intramedullary fixation is a valuable alternative method for patients with intertrochanteric fractures, which could be associated with lower levels of operation time, blood loss, and tissue damage.

PFN was associated with a lower risk of implant-related complications and could provide angular and rotational stability. These characteristics, with early mobilization and weight- bearing, were suitable for patients with osteoporotic bone and unstable intertrochanteric fractures.[41]

AIMS AND OBJECTIVES

- To assess the outcome of fracture in patients with cardiac conditions.
- To evaluate delay in surgery due to cardiac medication or any other cause.
- To study quality of life post hospital discharge.

REVIEW OF LITERATURE

A study by Xu B, Han L, Liu H, et al.[42] observed a significant association between CVD and hip fracture among older hospitalized patients in Beijing, China, with a 53% increase in the risk of hip fracture. Data were obtained from2006–2010 hospitalization summary reports of 31 tertiary hospitals in Beijing, China. This study included 864,408 inpatients aged ≥55 years. This association seems to be accounted for mainly by patients of 55 to 79 years old, and by specific subtype of CVD, the cerebrovascular disease, as evidenced by a more than 2- fold increase in the estimated hip fracture risk. In addition, hypertensive disease did not modify the association between cerebrovascular disease and hip fracture. The occurrence rate of hip fracture is 53% higher among older in patients with a diagnosis of CVD than those without (RR = 1.53, 95% CI 1.47–1.60). Those with hip fracture were more likely to have hypertensive or cerebrovascular disease, with the risk ranging from 1.34 to 1.70. Compared with those without hip fracture, the occurrence rate of overall CVDs increased by 80%, 83%, and 16% among hip fracture patients aged 55–64, 65–79, and ≥80 years. In addition, hypertensive disease did not modify the association between cerebrovascular disease and hip fracture.

Hip fracture trends 1970–2009[43]

While somewhat variable, data published since the early 1990s describing the occurrence of hip fractures across the globe has generally shown the age-adjusted incidence of this injury is increasing or is projected to increase. Accordingly, it was initially predicted that if there was a steady increase in the numbers of United States residents reaching the age of 85 years or older, the numbers of elderly at risk for a hip fracture would double by 2007. That is, the total number of hip fracture cases in later life was not only expected to remain significant, but was projected to rise substantively. At the same time, this age-associated trend in longevity was not only influencing hip fracture risk in the United States, but was also evident in The People's Republic of China where hip fracture rates, once amongst the lowest in the world

compared with more affluent countries, increased by 34% for women and 33% for men between 1988 to 1992. Similarly, in Finland, the whole population incidence rate increased approximately three fold between 1970 and 1991 with respect to both genders, and between 1970 and 1997, the age-specific incidence of hip fractures increased in all age groups.

However, as the number of older adults living to higher ages increases globally, the total numbers of hip fracture cases and their related expenditures are likely to rise substantively. Hip fracture incidence may also be hard to capture with precision because rates may vary depending on seasonality, geography, and factors other than aging. These include health status, ethnicity, gender, neuromuscular status, extent of urbanization, along with year of immigration to the United States, the availability, nature, and potency of current therapeutic and/or preventive measures.

Another study by Ulf Sennerby; H.Melhus; et al.[44] in 2009 in a cohort of all 31 936 Swedish twins born from 1914-1944 was followed up from the age of 50 years revealed that a diagnosis of CVD was significantly associated with risk of subsequent hip fracture. Increased risks in co-twins without an index diagnosis suggest genetic factors in the association between CVD and osteoporotic fractures. The crude absolute rate of hip fractures was 12.6 per 1000 person-years after a diagnosis of heart failure, 12.6 per 1000 person-years after a stroke, 6.6 per 1000 person years after a diagnosis of peripheral atherosclerosis, and 5.2 per 1000 person-years after a diagnosis of ischemic heart disease compared with 1.2 per 1000 person-years for those without a CVD diagnosis.

Gerber et al.[45] compared between all Olmsted County, Minnesota, residents aged 50 years or older with a first radiographically confirmed hip fracture in 1985–2006 and community control subjects individually matched (1:1) to cases on age, sex, and index year (n=3, 808; mean age [SD], 82 [9] years; 76% women) and published that all cardiovascular and numerous non-cardiovascular disease categories (e.g., infectious diseases, nutritional and metabolic diseases, mental

disorders, diseases of the nervous system and sense organs, and diseases of the respiratory system) were associated with fracture risk. However, increasing temporal trends were almost exclusively detected in cardiovascular disease categories. The largest increases in association were observed for ischemic heart disease, other forms of heart disease (including heart failure), hypertension, and diabetes and were more pronounced among elderly women than among other demographic subgroups.

Sennerby U et al[44] found the highest hip fracture rates early after diagnosis of heart failure or stroke. Such rates have previously been observed after stroke but not after heart failure. The time course of the hip fracture rate may have been partially related to immobilization after the CVD event. A concomitant decrease in muscle strength and postural stability may increase the risk for falls and subsequently for fractures. Moreover, immobilization increases the rate of bone loss that can further increase the risk of fracture. Increased bone loss has been observed after the diagnosis of heart failure, hypertension, and stroke[46] .

In a prospective study in women, Bagger et al[47] verified the cross sectional finding of Schulz et al[48] that severe aortic calcifications increased the relative risk of hip fracture 2-fold to 3-fold. In contrast, a recent Framingham Heart Study report indicated that the severity of aortic calcifications did not significantly affect hip fracture rate.

Sennerby, U., Farahmand, B., Ahlbom, A. et al.[49] conducted a population-based case-control study of 1,327 incident hip fracture cases and 3,170 randomly selected population controls among women 50-81 years old in Sweden. The study observed a gradient increase in risk of hip fracture with increasing number of hospitalizations for CVD and highest fracture risk occurred the first year after the CVD event. Hypertension, heart failure, and cerebrovascular lesions remained independent risk factors, with 2- to 3-fold increases in odds ratios, even after mutual adjustments for other CVDs. There was a substantially increased risk of hip fracture in women after a diagnosis of a CVD, a

finding compatible with the concept of common pathologic pathways for osteoporotic fractures and CVD.

Rathore LP et al.[50] study comprised a prospective study done on 104 patients operated for intertrochanteric fractures with PFN. Patients were followed up at 6 weekly intervals and evaluated at each visit using the modified Harris hip score (HHS). A total of 104 patients ranging from the ages of 39 to 96 years with an average of 67.8 years. Patients were evaluated according to HHS at varying intervals throughout the recovery period and final scoring was done at minimum one year follow up. There were maximum patients in excellent to good results range (73% patients). 18% patients had a fair outcome, 7.7% had poor and 2% patients had very poor outcome.

A review of all articles published by S. Haleem et al.[51] on the outcome after hip fracture over a four decade period (1959-1998) was undertaken to determine any changes that had occurred in the demographics of patients and mortality over this time period. The mean age of patients sustaining hip fractures was found to be steadily increasing over the study period at a rate of 1 year of age for every 5-year time period. The mean age in the 1960s was 73 years to a mean of 79 years in the 1990s. No notable differences were seen in the proportion of male patients over the years but a definite downward trend was noticed with regard to intracapsular fractures. The mortality at 6 and 12 months after injury remained essentially unchanged over the four decades reviewed.

Mortality after a hip fracture remains significant, being 11—23% at 6 months and 22-29% at 1 year from injury. Geographical variations exist in the mortality after hip fracture. More detailed international comparisons are required to determine if these differences in outcome are accounted for by the variations in the demographics of patients or due to diversities in treatment methods.

According to Cumming[52] many factors are determining whether a particular fall results in a fracture of the hip like fall is on or near the hip, lack of protective reflex, inadequate muscles and fat around hip to act as shock absorber and poor bone strength.

In a comparative prospective study by Parsurampuriya VK et al.[53] in which 40 patients were taken and treated either with dynamic hip screw or proximal femoral nailing. The clinical data will be collected and compared with pre-injury activity and present functional level with modified Harris hip score. The study found that there is no significant difference between Harris hip score in stable fracture (p value=0.222) fixed either with DHS or PFN. But there is statistically significant difference of score in unstable fracture (p value 0.040) treated by DHS and PFN. Functionally, utilizing the Harris hip scoring system, at the final follow-up, our study affirms PFN to be superior to DHS in unstable intertrochanteric fractures while in stable fractures, functional results are same. PFN is also found better in unstable fractures, because a greater number of patients having excellent Harris hip score. In stable fracture, functional result is same in both groups.

M. Bhandari et al[54] conducted a retrospective cohort study in 185 patients in tertiary care hospital to identify predictors of in-hospital mortality and hospital stay following hip fractures. Individuals requiring operative treatment of a proximal femoral fracture excluding those individuals < 50 years old, with femoral head or subtrochanteric fractures, and significant co-morbidity. 116 patients met the inclusion criteria. Predictors of in-hospital mortality from logistic regression analysis included male gender (odds ratio with 95% CI: 5.5, 1.5-20.5), admission from a long term care facility (5.5, 1.4-22.6), age greater than 90 years (4.5, 0.9-22.1), and living at home with support (0.2, 0.03-0.9). Predictors of hospital stay from multivariate regression analysis in order of magnitude included presence of a post-operative complication (odds ratio with 95% CI: 14.1, 4.7-44), living at home with support (3.4, 1.3-8.9) and older age (> 85 years) (2.7, 1.0-7.3). Moreover, confusion, urinary tract infections and decubitus ulcers accounted for greater than 50% of all complications encountered. A trend between the number of positive predictors and length of hospital stay was observed. The study revealed elderly individuals admitted from a long term care facility are at high risk of mortality following operative fixation of hip fractures. Early recognition and aggressive

management of post-operative complications such as confusion, urinary tract infections and decubitus ulcers through careful patient monitoring may decrease hospital stays in those that survive.

In a study conducted by J. Sanz-Reig et al[55] in 2018, a prospective study conducted on 331 hip fracture patients older than 65 years admitted to the Spain hospital from 2011 to 2014. Patients' demographics, pre hospitalization residential status, pre-fracture comorbidity data, anti-aggregant and anticoagulant medication, preoperative hemoglobin value, type of fractures, type of treatments, time to surgery, and complications were recorded. The study revealed that the average age was 83 years, 73% female, and 57% of them sustained a femoral neck fracture. In 62.8% of patients, the number of pre-fracture baseline comorbidities was 2. The in-hospital mortality rate was 11.4%. In multivariate analysis, age over 90 years, congestive heart failure, asthma, rheumatologic disease, lung cancer, and not taking anti-aggregant medication were independently associated with in-hospital mortality. A formula and risk stratification scoring for predicting the risk for in-hospital mortality was developed. Risk-adjustment model based on these variables had acceptable accuracy for predicting in-hospital mortality (c-statistic 0.77). The study revealed advanced age, and five prefracture comorbidities had a strong association with in-hospital mortality in a hip fracture patient older than 65 years old. The predictive model was specifically designed for the old hip fracture population. It had an accuracy similar to other risk models. The specificity, positive predictive value, and negative predictive value were high. In addition, it could discriminate a high risk patient from a low risk patient for in-hospital mortality.

A population based historical cohort study conducted by Cullen et al[56] of 1,116 Olmsted County, MN residents undergoing 1,212 hip surgeries from 1988 through 2002. Data were obtained through medical record review. Heart failure was defined by Framingham criteria.

The study revealed the prevalence of preoperative heart failure in 27% (327 of 1,212 cases). Those with preoperative heart failure demonstrated longer lengths of stay, were more often discharged to a

skilled facility, and had higher inpatient mortality rates. Rates of postoperative heart failure were 6.7% at seven days and 21.3% at one year. Postoperative heart failure was more common among those with preoperative heart failure (HR 3.0), and those with preoperative heart failure demonstrated higher postoperative mortality rates. Men had a higher risk of postoperative mortality compared to women. Overall survival was lowest among those with both preoperative and postoperative heart failure.

The study showed that heart failure represents a common and serious perioperative condition in hip fracture patients. Hip fracture patients with and without heart failure carry higher postoperative risk than guidelines may suggest. Future work must focus on the perioperative management of hip fracture patients with and without heart failure to mitigate postoperative morbidity.

Studies concerning cardiac screening in hip fracture patients by S.J.M. Smeets et al[57] was done on 166 hip fracture patients within a 3-year inclusion period. The preoperative cardiac screening and adherence to the ACC/AHA guideline were analyzed. Cardiac risk was classified as low, intermediate and high risk.

TABLE 1: THE AMERICAN COLLEGE OF CARDIOLOGY/AMERICAN HEART ASSOCIATION CLINICAL PREDICTORS FOR EACH RISK GROUP

Low risk.	Intermediate risk	High risk
Advanced age Abnormal ECG Rhythm other than sinus	Mild angina pectoris Prior myocardial Infarction Compensated or prior cardiac heart failure	Unstable coronary syndromes Decompensated cardiac heart failure Significant arrhythmias
Low functional capacity History of stroke Uncontrolled hypertension	Diabetes mellitus	Severe valvular disease

Secondary outcome measurements were delay to surgery, perioperative complications and in-hospital, 30-day, 1-year and 2-year mortality. The results revealed that 87% of patients received correct preoperative cardiac screening according to the ACC/AHA guideline. The most important reason for incorrect preoperative cardiac screening was over screening (>90%). Multivariate analysis showed that a cardiac consultation (p=0.003) and over screening (p=0.02) as significant predictors for increased delay to surgery, while age, sex, previous cardiac history and preoperative mobility were not. High risk patients had in comparison with low risk patients a significantly higher relative risk ratio for in-hospital mortality (RR 6, 95% CI 2–17). Multivariate analysis showed that a previous cardiac history and increased delay to surgery were predictors for early mortality. High age and previous cardiac history were risk factors for late mortality. Hence preoperative cardiac screening for hip fracture patients in adherence to the ACC/AHA guideline is associated with a diminished use of preoperative resources. Over screening leads to greater delay to surgery, which poses a risk for perioperative complications and early mortality.

Delay in surgery

As per Klestil et al.[58] delay in surgeries after acute hip fracture in elderly patients are common and attributable to several factors. Specifically, in hospitals with several surgical disciplines, a competition for limited acute surgical capacities (e.g., operating rooms) may determine the timing of surgery. Another factor contributing to delayed surgery is anti- coagulant medications, particularly new oral anticoagulants (NOACs). Many patients suffering from hip fractures are treated with anticoagulant medication. For some NOACs, no specific antidotes to block their activity are currently available. Doctors, therefore, often prefer to wait for the effects of this medication to wear off prior to operating on the patient. Such an approach, however, is controversial because studies have claimed that patients treated with NOACs survive early surgery without any adverse health effects.

In a study by Karakus et al[59] which included patients aged > 65 years who underwent surgery with APFN.Group 1 comprised AO classification, AO/OTA 31-A22, and A23 patients, and group 2, A31 and A32 patients. The demographic data of the patients, postoperative complications, follow-up, mortality status, postoperative reduction, tip-apex distance (TAD), and the Parker-Palmer mobility (PPM) score were evaluated. There were no statistically significant differences between the groups in terms of gender, affected side, time from trauma to surgery, ASA score, anesthesia type, duration of hospitalization, duration of surgery, TAD values, reduction values, or mortality rate. The average age of patients in group 2 was significantly higher than that of patients in group 1 ($p < 0.05$). The mobility scores of group 1 patients were significantly higher than those of group 2 ($p < 0.05$). The average time from trauma to surgery was 7.85 ±2.83 days (range 3–17 days), the average operation time was 55.19 ±15.51 min (range 30–90), and the average length of stay in hospital was 8.89 ± 2.89 days (range 4–18 days).While no relationship was found between the TAD values and the reduction status of the cases, the PPM scores of the AO 31 A3 cases were determined to be significantly worse. Therefore, fractures with a preoperative classification of AO type 31 A3 can be expected to have worse results than A2 ITF fractures. The fracture type seems to have as great an effect as other factors on the postoperative mobility score.

COMPLICATIONS

As per Carpintero P et al.[60] ,hip fracture surgery represents a large quota of the orthopedic surgeon activity, and normally has associated major clinical and social cost implications. Though hip fracture incidence has declined in many countries during the last decade, it still represents around 1/4 of the geriatric fractures that require hospital admission, and in spite of the enhancements in both surgical and medical services, its morbidity and mortality remains elevated. Over 90% of hip fracture patients are older than 65 years old and have preexisting medical comorbidities. Both factors have an important influence in its prognosis and treatment. Even with optimal care, elderly

trauma patients suffer a higher morbidity and mortality rate when compared with the general population, and often demand for expensive hospital aftercare. Because of that, surgical treatment of hip fracture in these patients has exceptional clinical challenges, and needs strategies to optimize patient care. Acute orthogeriatric units, with a medical co-management of these patients, offer the best chance for a successful outcome, with some studies demonstrating a decrease in postoperative complications and mortality. Early surgical fixation, the role of anti-thromboembolic and anti-infective prophylaxis, good pain control at the perioperative, detection and management of delirium, correct urinary tract management, avoidance of malnutrition, vitamin D supplementation, osteoporosis treatment and promotion of early mobilization to improve functional recovery and falls prevention are basic recommendations for an optimal care of hip fractured patients.

In a study by Monk TG[61], cognitive complications appear in approximately 10% of patients after hip fracture surgery, being more common in elderly (> 65 years) than younger patients.

Dolan MM et al[62] reported that postoperative delirium in patients with hip fracture appears normally after surgery, and affects 13.5% to 33% of these patients.

A report of the American College of Cardiology and the American Heart Association (ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Non-cardiac Surgery) estimates at less than 5% the risk of cardiac complication in postoperative after orthopedic major surgeries, but the 1-year recorded mortality exceeds 20% in patients with hip fracture (Fleisher LA et al[63]) Smeets SJ et al[57] researched that the main reasons of in-hospital cardiac related mortality after hip fracture are heart failure and myocardial ischemia, which normally come out quick after fracture in patients with previous heart affectation. The general incidence of perioperative myocardial ischemia in aged patients suffering hip fracture surgery has been informed to be 35% to 42% by Huddelston JM et al.[64]

In a study conducted by Bateman L et al [65], prevalence of perioperative anemia in hip fractured patients ranges from 24% to 44%, being even higher if consider only the postoperative one (51% to 87%).

The most common postoperative urinary tract complications after hip surgery are urinary retention, urinary infections and acute kidney injuries as found by Chong CP et al.[66]

Controlled trials by Schneider MA et al[67] found that patients who had scheduled intermittent catheterization immediately after surgery or their catheter removed the morning after surgery, had lower rates of urinary retention.

Johansson I[68] with others reported that urinary tract infections are the leading cause of nosocomial infection and affect 12% to 61% of all patients with hip fractures. Urinary tract infections are consideredan important delirium factor risk, and are responsible to prolong the hospital stay for another 2.5 d and even a higher mortality rate .(Dovjak P et al)[69]

Ulucay C et al[70] outlined the incidence of acute kidney injuries (AKI) among aging patients undergoing arthroplasty for femoral neck fractures ranges from 16% to 24.4%. Postoperative AKI (prerenal, renal or post-renal acute failure) is often multi-factorial and may be related to pre, peri or postoperative medical or surgical factors (age, emergency surgery or longer preparation time, dehydration, malnutrition, nephrotoxic drug use, including NSAID, type of surgical procedure, chronic obstructive pulmonary disease, congestive heart disease, peripheral vascular occlusive disease, chronic kidney disease, etc.)

Pressure scars result from an imbalance between extrinsic mechanical forces acting on skin and soft tissue, and the intrinsic susceptibility to tissue to collapse. Risk factors of pressure scars include age, malnutrition, history of smoking and systemic illnesses. The use of foam or alternating pressure mattresses, special beds and equipment to relieve pressure, aggressive skin care, nursing focused on prevention, and good nutrition help prevent the evolution to ulceration as researched by Bateman L et al.[65]

MATERIALS AND METHODS

Study Site:

The study was conducted at the Department of Orthopaedics, Dayanand Medical College, and Ludhiana.

Study Population:

The purpose of our study was to review and analyse the functional outcome of proximal femur fractures in patient with cardiac conditions. A prospective review of the medical records of 32 cases who underwent surgery at Dayanand Medical college Hospital, Ludhiana was performed. Patients were selected with proximal femur fracture with cardiac conditions after fulfilling the inclusion and exclusion criteria. After taking detailed history and examination , the patients were followed up after 4-6 weeks and 3-4 months. A detailed structured performa was filled and functional assessment was done using HHS (Harris hip score).

Inclusion criteria

1. Patients with proximal femur fracture.
2. Patients with Cardiac condition
3. Patients who gave informed consent and willing for follow up

Exclusion criteria

1. Pregnant patients
2. Open fractures.
3. Patients managed with hip replacement
4. Patients without cardiac condition

Sample Size: The study included 32 cases with proximal femur fracture with cardiac condition who consented to participate in the study.

Sampling Technique:

Patients who were admitted for proximal femur fracture with cardiac conditions at the Department of Orthopaedics, Dayanand Medical College, Ludhiana were selected after applying the relevant inclusion and exclusion criteria.

Study duration

The study was conducted over a period of 2 years and followed up at 4-6 weeks and 3-4 months.

Methodology

Data of patients who satisfied the eligibility criteria were included in the study. A written informed consent was taken from the patients. The ethical clearance certificate was taken from the ethical committee of the institute.

The complete demographic, personal, clinical history and cardiac history was taken in detail. A history of co-morbidities such as hypertension, diabetes was determined. The preliminary history, examination details and functional outcome was assessed using Harris Hip score and preformed structured performa.

Outcome

Final outcome was assessed at 4-6 weeks and 3-4 months follow up using modified Harris Hip score.

Statistical Analysis: Data will be described in terms of range; mean ±standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

Harris Hip Score [(71)]

The Harris hip score (HHS) is a joint specific score that is completed by both the clinician and the patient and consists of items covering domains of pain, function, functional activities. The HHS was initially described for assessment of functional outcome after mold arthroplasty for posttraumatic arthritis. The HHS has been used to evaluate functional outcome after pertrochanteric hip fracture and intracapsular fracture neck of femur .Construct validity of an outcome instrument shows that all the domains of the instrument are indeed measuring what they are supposed to measure. Responsiveness of an outcome instrument is defined as the sensitivity of the instrument to detect clinically relevant change over a period of time. Floor and ceiling effect

pertains to the proportion of patients achieving minimum possible score and the maximum possible score respectively. Validity and responsiveness are context specific terms and the evidence is applicable to a particular condition and specific intervention only. The HHS is a valid and reliable outcome instrument to assess functional outcome after total hip replacement. The cohort of patients undergoing surgical treatment for hip fractures is complex due to factors like cognitive impairment and co-morbidities and hence investigation is required to assess whether outcome instruments like HHS or mHHS which have been shown to be valid and responsive in cohort of patients with non-traumatic hip conditions continue to demonstrate validity and responsiveness in cohort of patients with proximal femur fracture. The responsiveness and floor ceiling effects of the Harris hip score has been described in intracapsular neck of femur fracture. However, though commonly used to assess functional outcome after intertrochanteric hip fractures, there is no report on validity, responsiveness and floor ceiling effect of either the Harris hip score or the modified Harris hip score after pertrochanteric fracture. Sitting in cross leg position and squatting on toes are essential activities for patients in the rural setting in the Indian sub-continent. The original Harris hip score does not contain ability to perform squatting and sitting cross legged as items in the questionnaire and hence a need was felt to modify the Harris hip score so that it could stay relevant in functional assessment of Indian patients in the rural setting.

Method of administration.

The HHS is a clinician-based outcome measure administered by a qualified health care professional, such as a physician or a physical therapist.

Response options/scale.

The score has a maximum of 100 points (best possible outcome) covering pain (1 item, 0–44 points), function (7 items, 0–47 points), absence of deformity (1 item, 4 points), and range of motion (2 items, 5 points).

TABLE 2: MODIFIED HARRIS HIP SCORE.

Variable	Points
Pain	
None or ignores it	44
Slight, occasional	40
Mild pain, rarely moderate	30
Moderate pain	20
Marked pain	10
Totally disabled, pain in bed	0
Function	
Limp	
None	11
Slight	8
Moderate	5
Severe	0
Support	
None	11
Cane, long walks	7
Cane, most of the time	5
One crutch	3
Two canes	2
Two crutches	0
Not able to walk	0
Distance walked	
Unlimited	11
Six blocks	8
Two to three blocks	5
Indoors only	2
Bed and chair	0
Stairs	
Normally without railing	4
Normally with railing	2
In any manner	1
Unable to do	0
Shoes and socks	
With ease	4
With difficulty	2
Unable	0
Sitting	
Ordinary chair for 1 h	5
High chair for 1 h	3
Unable to sit in any chair	0
Public transport	
Able to use	1
Unable to use	0

Scoring.

Each item has a unique numerical scale, which corresponds to descriptive response options. The number of response options varies by item, as does the number of points assigned to each response

option. The range of motion item consists of 6 motions that are graded based on the arc of motion possible. Each range of motion gradation is assigned an index factor and a maximum possible value, which are used to calculate arc of motion points. These points are added and multiplied by 0.05 to receive the total points for range of motion. The total score is calculated by summing the scores for the 4 domains.

Score interpretation.

The HHS score gives a maximum of 100 points. Pain receives 44 points, function 47 points, range of motion 5 points, and deformity 4 points. Function is subdivided into activities of daily living (14 points) and gait (33 points).

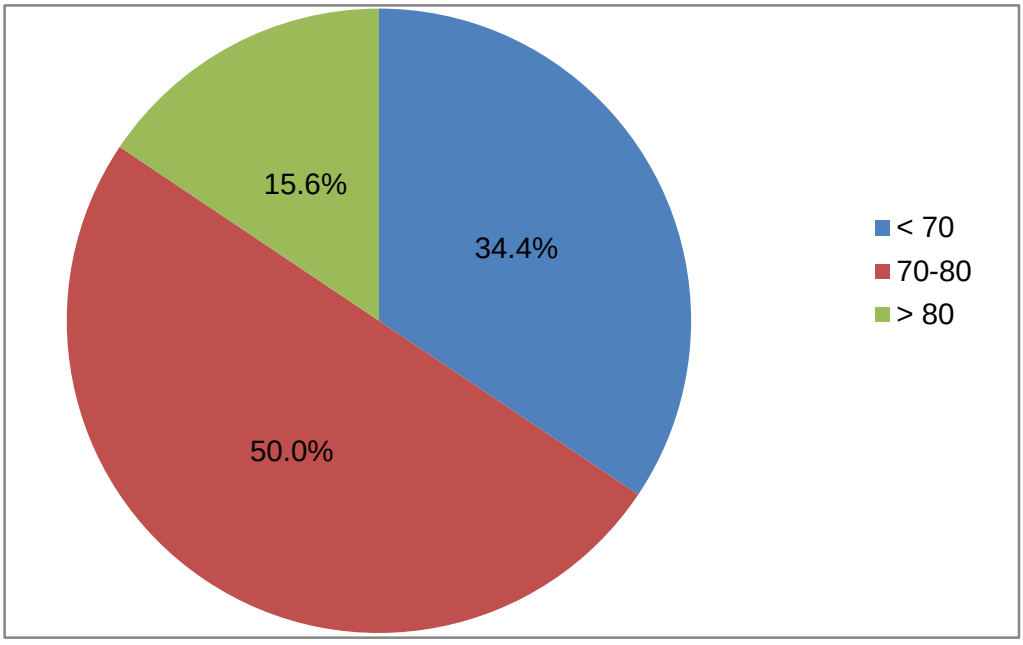
The higher the HHS, the less dysfunction. A total score of <70 is considered a poor result; 71–80 is considered fair, 81–90 is good, and 91–100 is an excellent result.

OBSERVATION AND RESULTS

TABLE 3: DISTRIBUTION OF AGE OF STUDY SUBJECT

AGE GROUP	No. of cases	Percentage
< 70	11	34.4%
70-80	16	50.0%
> 80	5	15.6%
Total	32	100.0%

FIGURE 1: DISTRIBUTION OF AGE OF STUDY SUBJECTS

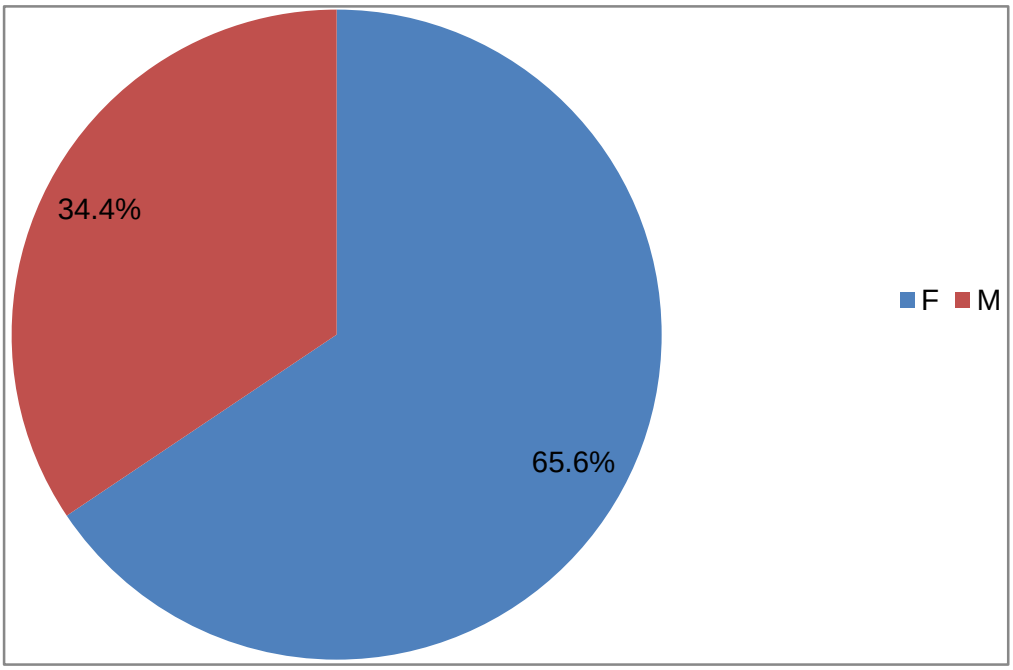


In the present study, majority of the subjects (50%) belonged to age group between 70-80 years. 34.4% of the patients belonged to age group of <70 years and 15.6% of the subjects belonged to >80 years of age.

TABLE 4: DISTRIBUTION OF GENDER OF STUDY SUBJECTS.

SEX	No. of cases	Percentage
F	21	65.6%
M	11	34.4%
Total	32	100.0%

FIGURE 2: DISTRIBUTION OF GENDER OF STUDY SUBJECTS



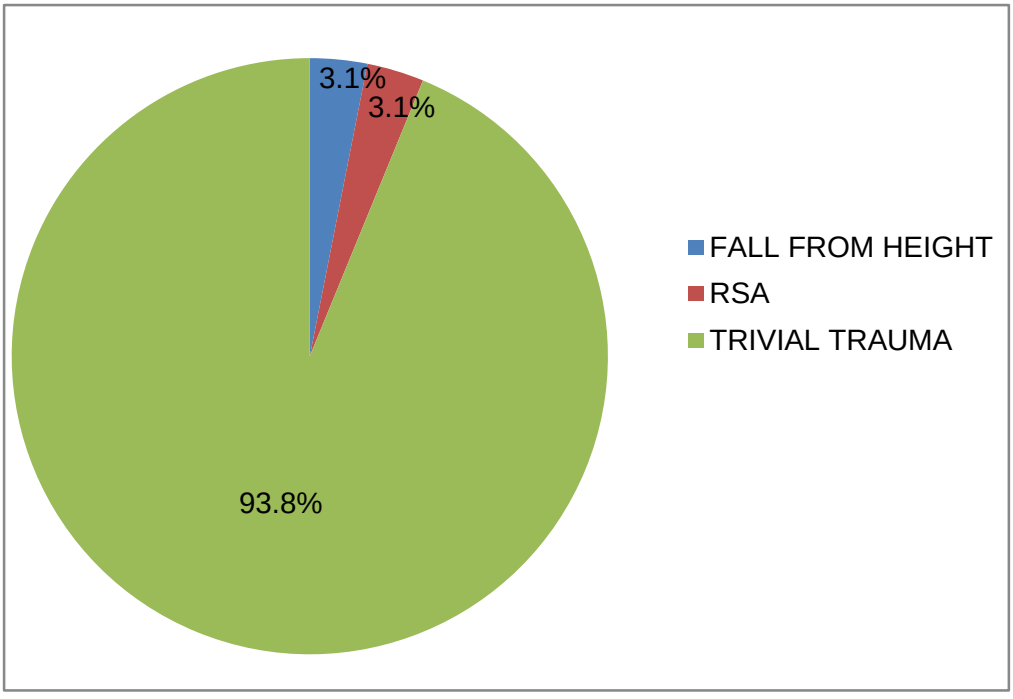
The study represents majority of female subjects with approx. 65.6% and 34.4% of male subjects.

N=32

TABLE 5: DISTRIBUTION OF MODE OF INJURY OF STUDY SUBJECTS

MODE OF INJURY	No. of cases	Percentage
FALL FROM HEIGHT	1	3.1%
RSA	1	3.1%
TRIVIAL TRAUMA	30	93.8%
Total	32	100.0%

FIGURE 3: DISTRIBUTION OF MODE OF INJURY OF STUDY SUBJECTS

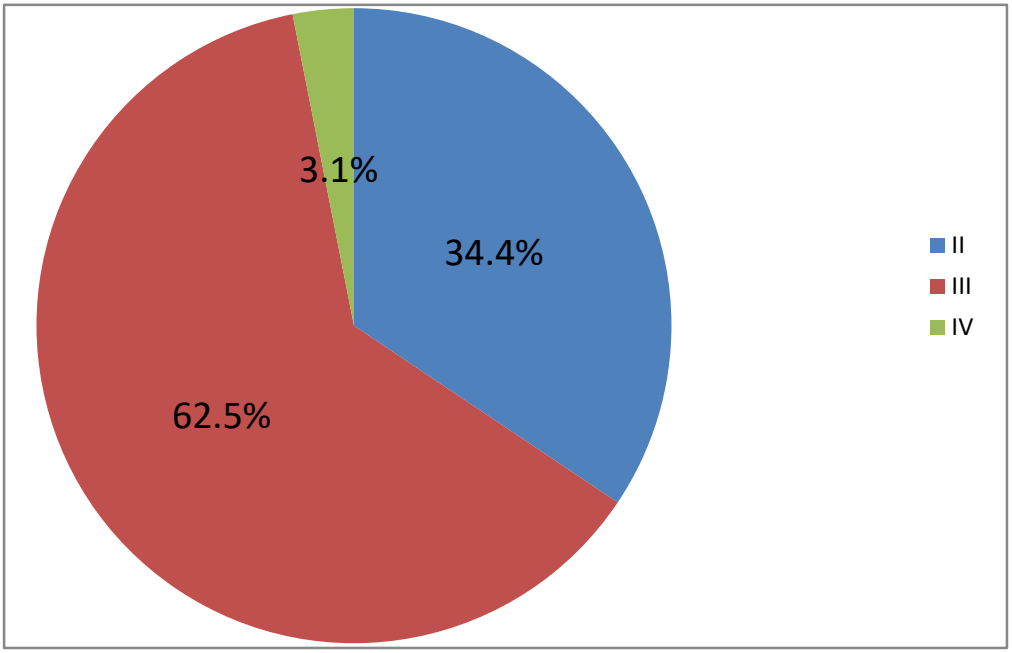


The study represents that majority of patients had trivial trauma 93.8% with 3.1% of the subjects had the history of fall from height. 3.1% of the subjects had the history of road side accident. Trivial fall attributes to the most common cause of mode of injury in our study.

TABLE 6: CLASSIFICATION OF BOYD & GRIFFIN CLASSIFICATION AMONG SUBJECTS.

BOYD AND GRIFFIN CLASSIFICATION	No. of cases	Percentage
I	0	0.0%
II	11	34.4%
III	20	62.5%
IV	1	3.1%
Total	32	100.0%

FIGURE 4: DISTRIBUTION OF BOYD & GRIFFIN CLASSIFICATION AMONG THE SUBJECTS

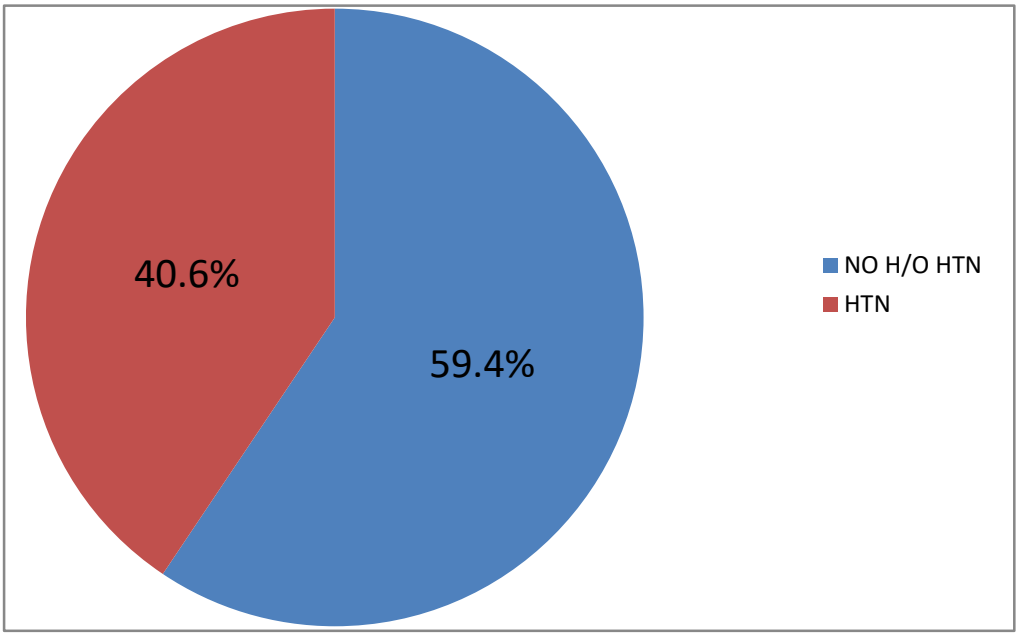


In our study, most of the patients 62.5% were found in Type-III Boyd & Griffin Classification. Minimum no. of patients were found in Type-IV Boyd & Griffin classification. Only 11 patients were found in type-II classification and no patient was found under Type-I classification. (N=32).

TABLE 7: DISTRIBUTION OF SUBJECTS WITH HYPERTENSION

HYPERTENSION	No. of cases	Percentage
NO H/O HTN	19	59.4%
HTN	13	40.6%
Total	32	100.0%

FIGURE 5: DISTRIBUTION OF SUBJECTS WITH HYPERTENSION

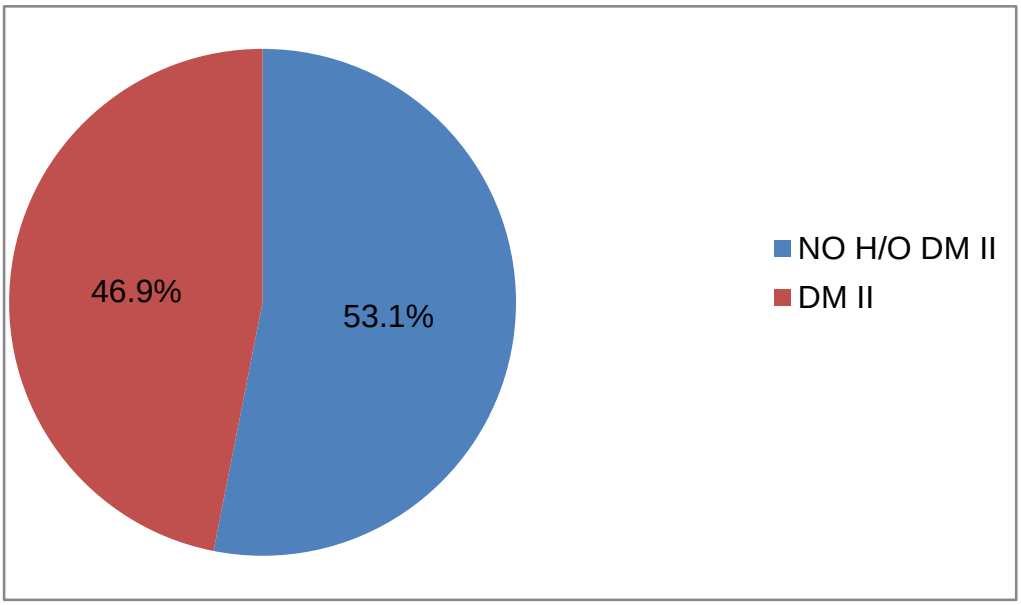


In our study, 40.6 % of the subjects that is 13 subjects out of 32 subjects had the history of hypertension.

TABLE 8: DISTRIBUTION OF SUBJECTS WITH H/O DIABETES MELLITUS TYPE-II

Diabetes Mellitus	No. of cases	Percentage
NO H/O DM II	17	53.1%
DM II	15	46.9%
Total	32	100.0%

FIGURE 6: DISTRIBUTION OF SUBJECTS WITH H/O DIABETES MELLITUS TYPE-II

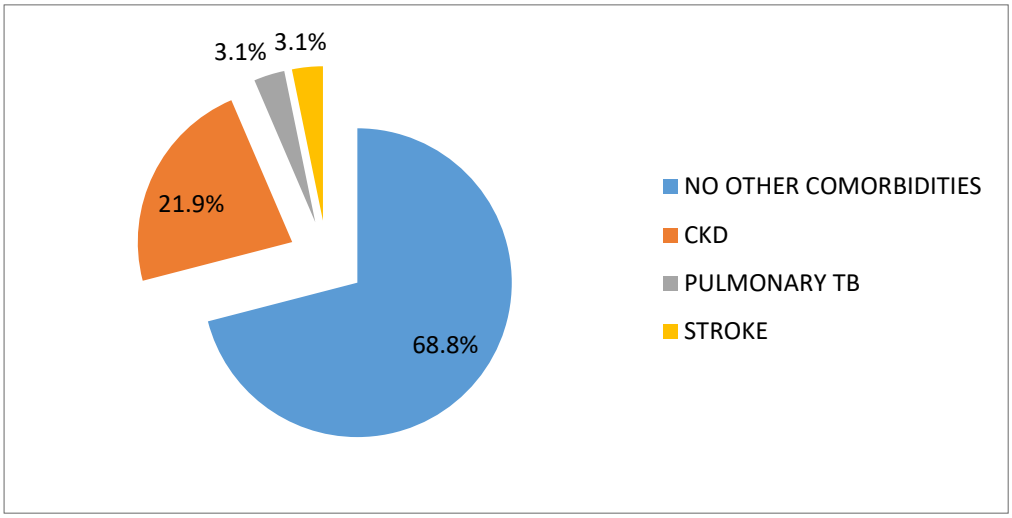


In our study, 46.9% patients had the H/O DM type-II and 53.1% of the patients had no H/O DM Type II.

TABLE 9: DISTRIBUTION OF COMORBIDITIES AMONG THE SUBJECTS.

Others (CKD, stroke, seizures)	No. of cases	Percentage
CKD	7	21.9%
PULMONARY TB	1	3.1%
STROKE	1	3.1%
NO OTHER COMORBIDITIES	22	68.8%
Total	32	100.0%

FIGURE 7: DISTRIBUTION OF COMORBIDITIES AMONG THE SUBJECTS

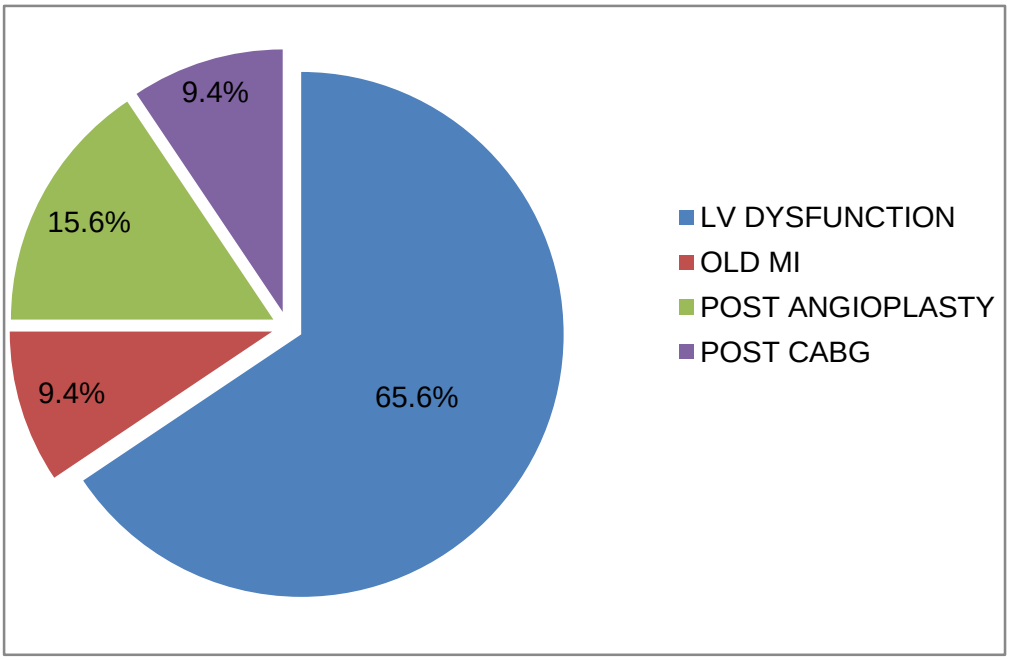


The study showed that 21.9% of the patients had CKD with 3.1% of the patients had pulmonary TB and H/O stroke.

TABLE 10: DISTRIBUTION OF IHD AMONG THE SUBJECTS.

IHD	No. of cases	Percentage
LV DYSFUNCTION	21	65.6%
OLD MI	3	9.4%
POST ANGIOPLASTY	5	15.6%
POST CABG	3	9.4%

FIGURE 8: DISTRIBUTION OF IHD AMONG THE SUBJECTS

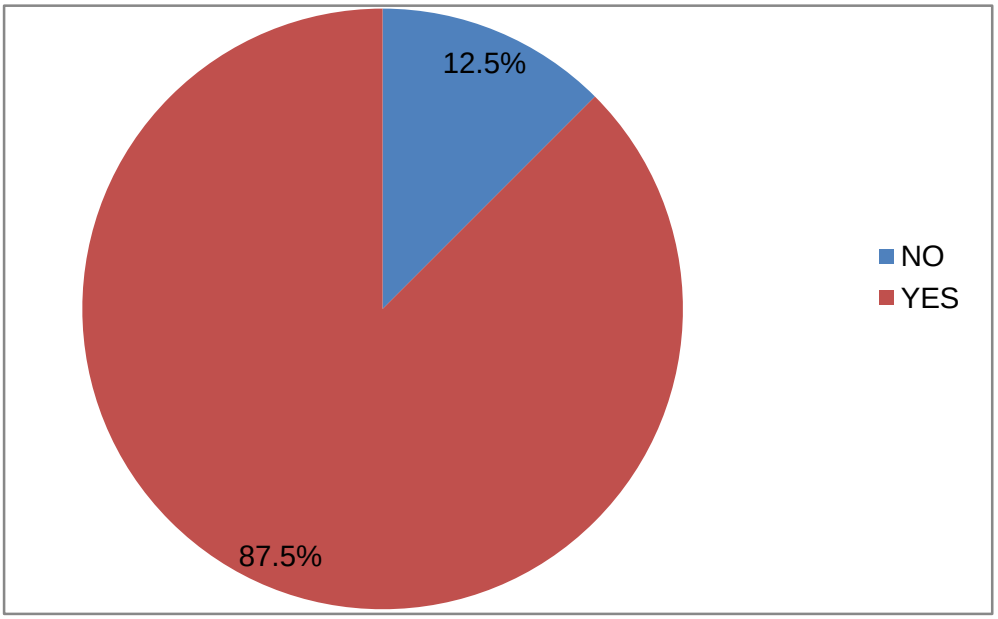


Our study found that majority of the patients 65.6% had LV dysfunction. 9.4% of the patients had an old MI. 15.6% of the patients underwent angioplasty. Out of 32 subjects, 3 subjects had under gone CABG. Thus our study attributes LV dysfunction as the most common attribute to IHD followed by angioplasty.

TABLE 11: DISTRIBUTION OF SUBJECTS WHO HAVE TAKEN ANTI-PLATELET AGENTS BEFORE ADMISSION.

ANTI-PLATELET AGENTS TAKEN OR NOT	No. of cases	Percentage
NO	4	12.5%
YES	28	87.5%
Total	32	100.0%

FIGURE 9: DISTRIBUTION OF SUBJECTS WHO HAVE TAKEN ANTI-PLATELET AGENTS BEFORE ADMISSION

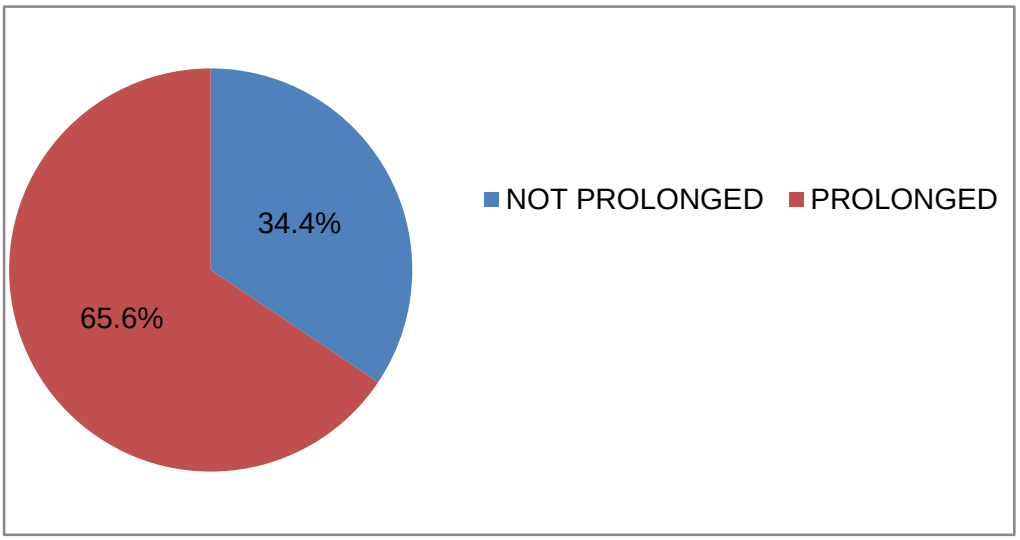


Our study found 87.5% subjects took anti-platelet agent before admission.

TABLE 12: DISTRIBUTION OF SUBJECTS WHOSE HOSPITAL STAY WAS PROLONGED.

HOSPITAL STAY	No. of cases	Percentage
NOT PROLONGED	11	34.4%
PROLONGED	21	65.6%
Total	32	100.0%

FIGURE 10: DISTRIBUTION OF SUBJECTS WHOSE HOSPITAL STAY WAS PROLONGED

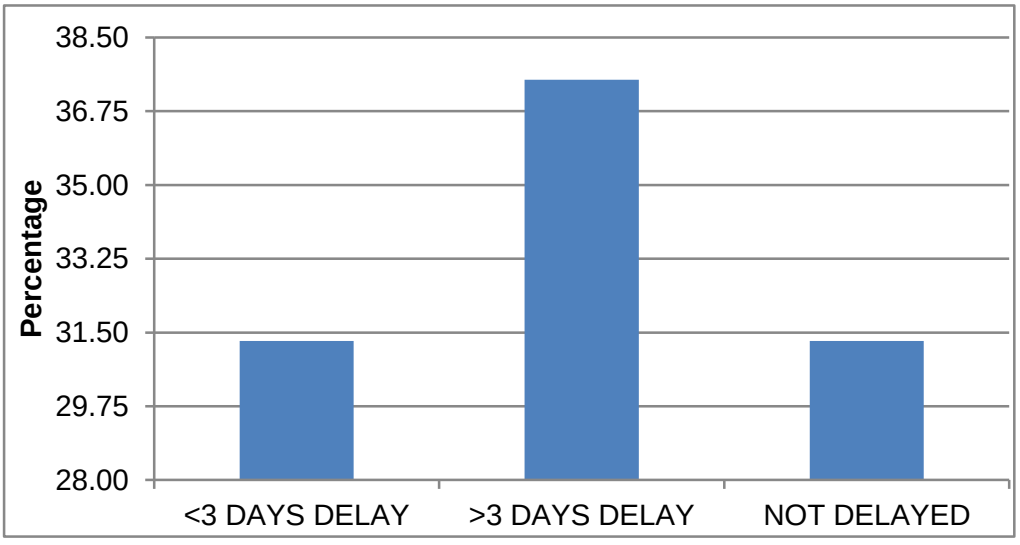


Our study showed that hospital stay was prolonged in 65.6% of the total subjects. 34.4% of the subjects had normal hospital stay.

TABLE 13: DISTRIBUTION OF TIME PERIOD DELAY IN OPERATION AMONG SUBJECTS.

TIME PERIOD DELAY IN OPERATION	NO. OF PATIENTS	PERCENTAGE
<3 DAYS DELAY	10	31.3%
> 3 DAYS DELAY	12	37.5%
NOT DELAYED	10	31.3%
TOTAL	32	100.0%

FIGURE 11: DISTRIBUTION OF TIME PERIOD DELAY IN OPERATION AMONG SUBJECTS

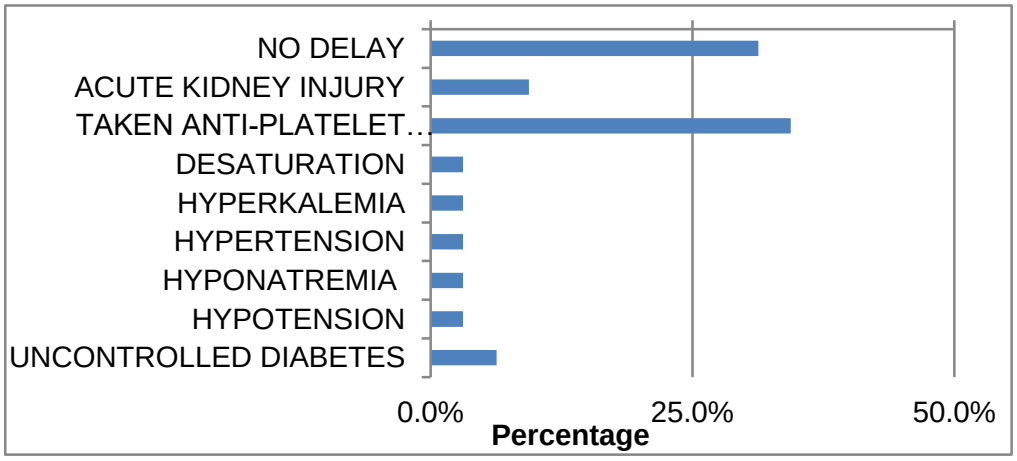


In our study, it was found that 31.3% of the subjects, surgery was delayed by <3 days. In 37.5% of the subjects, surgery was delayed by >3 days. However, In 31.3 % of the subjects, surgery was not delayed.

TABLE 14: DISTRIBUTION OF CAUSE OF DELAY IN SUBJECTS UNDERGOING SURGERY.

CAUSE OF DELAY IN OPERATION	No. of cases	Percentage
NO DELAY	10	31.3%
ACUTE KIDNEY INJURY	3	9.4%
TAKEN ANTI-PLATELET (CLOPIDOGREL)	12	37.5%
DESATURATION	1	3.1%
HYPERKALEMIA	1	3.1%
HYPERTENSION	1	3.1%
HYPONATREMIA	1	3.1%
HYPOTENSION	1	3.1%
UNCONTROLLED DIABETES	2	6.3%
Total	32	100.0%

FIGURE 12: DISTRIBUTION OF CAUSE OF DELAY IN SUBJECTS UNDERGOING SURGERY

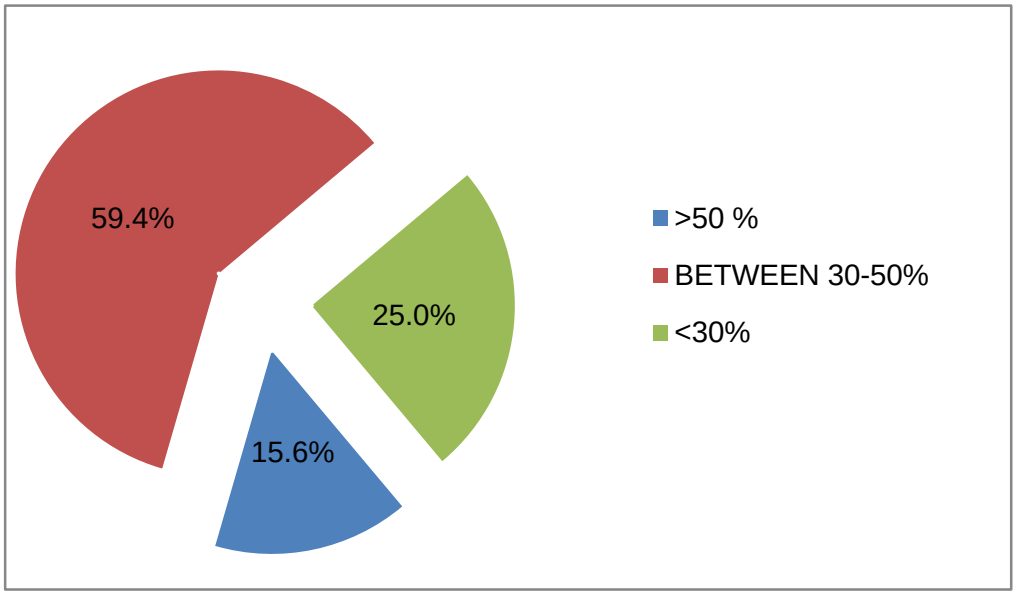


Our study found that most common cause of delay in surgery was the intake of anti-platelet agent(T. Clopidogrel), found in 37.5 % of the subjects. Similarly other causes which added onto delay in surgery were found to be uncontrolled diabetes, hypertension, hypotension, hyponatremia, hyperkalemia, AKI, desaturation, etc.

TABLE 15: DISTRIBUTION OF ECHO FINDINGS (Ejection Fraction) AMONG THE SUBJECTS

ECHO FINDINGS (EJECTION FRACTION)	No. of cases	Percentage
>50%	5	15.6%
BETWEEN 30-50%	19	59.4%
LESS THAN 30%	8	25.0%

FIGURE 13: DISTRIBUTION OF ECHO FINDINGS (Ejection Fraction) AMONG THE SUBJECTS

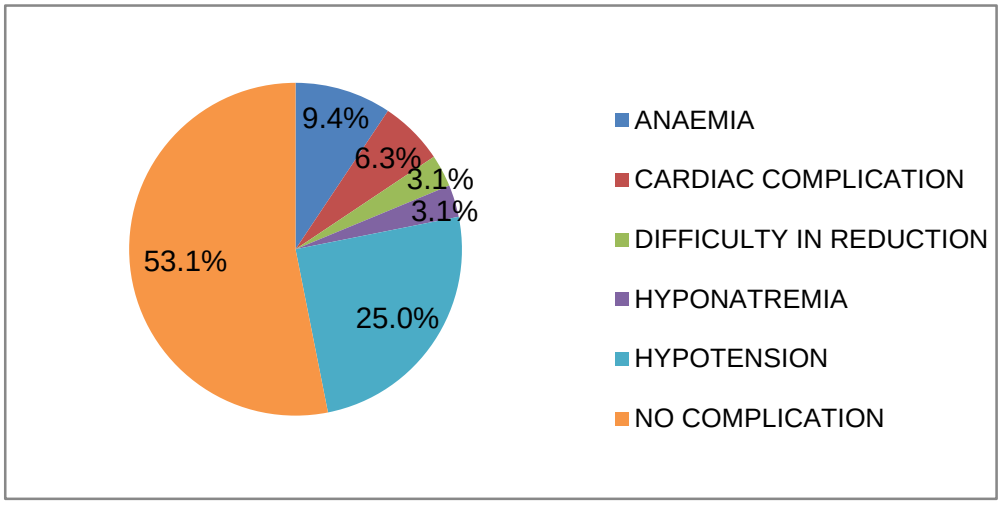


The study revealed that 25% of the subjects had EF less than 30%, 59.4% of the subjects had EF between 30-50%, 15.6% of the subjects had EF >50%.

TABLE 16: DISTRIBUTION OF PERIOPERATIVE COMPLICATIONS AMONG THE SUBJECTS

Perioperative	No. of cases	Percentage
ANAEMIA	3	9.4%
CARDIAC COMPLICATION	2	6.3%
DIFFICULTY IN REDUCTION	1	3.1%
HYPONATREMIA	1	3.1%
HYPOTENSION	8	25.0%
NO COMPLICATIONS	17	53.1%
Total	32	100.0%

FIGURE 14: DISTRIBUTION OF PERIOPERATIVE COMPLICATIONS AMONG THE SUBJECTS.

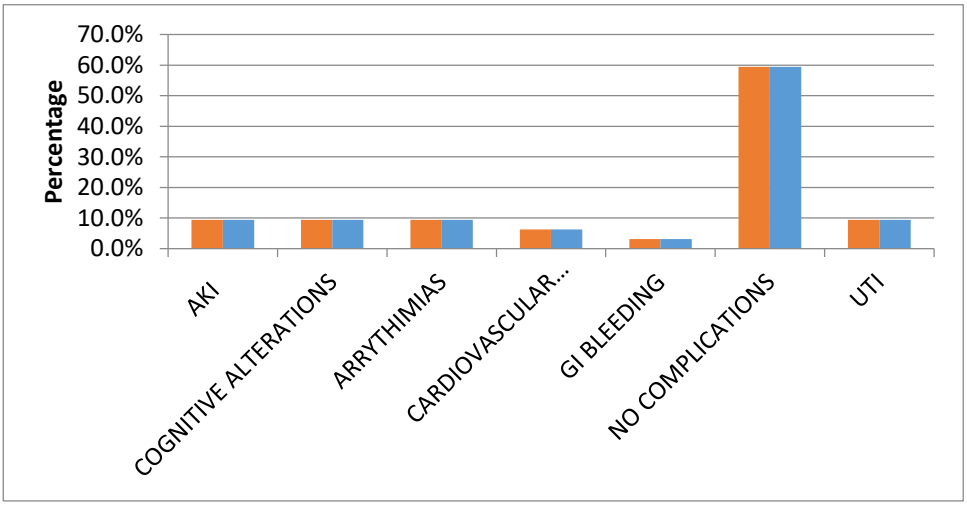


In the present study, 53.1 % of the subjects had no perioperative complications. Hypotension was noted in 25% of the subjects. Anaemia was found in 3 subjects (9.4%) perioperatively. 6.3% of the subjects had cardiac complications. In 3.1% of the subjects, difficulty in reduction was noted. Hyponatremia was one of the perioperative complication found in 3.1 % of the subjects.

TABLE 17: DISTRIBUTION OF IMMEDIATE POST-OP COMPLICATIONS AMONG THE SUBJECTS

IMMEDIATE POST OP	No. of cases	Percentage
AKI	3	9.4%
COGNITIVE ALTERATIONS	3	9.4%
ARRYTHIMIAS	3	9.4%
CARDIOVASCULAR COMPROMISE (MI, ACS)	2	6.3%
GI BLEEDING	1	3.1%
NO COMPLICATIONS	19	59.4%
UTI	3	9.4%

FIGURE 15: DISTRIBUTION OF IMMEDIATE POST-OP COMPLICATIONS AMONG THE SUBJECTS

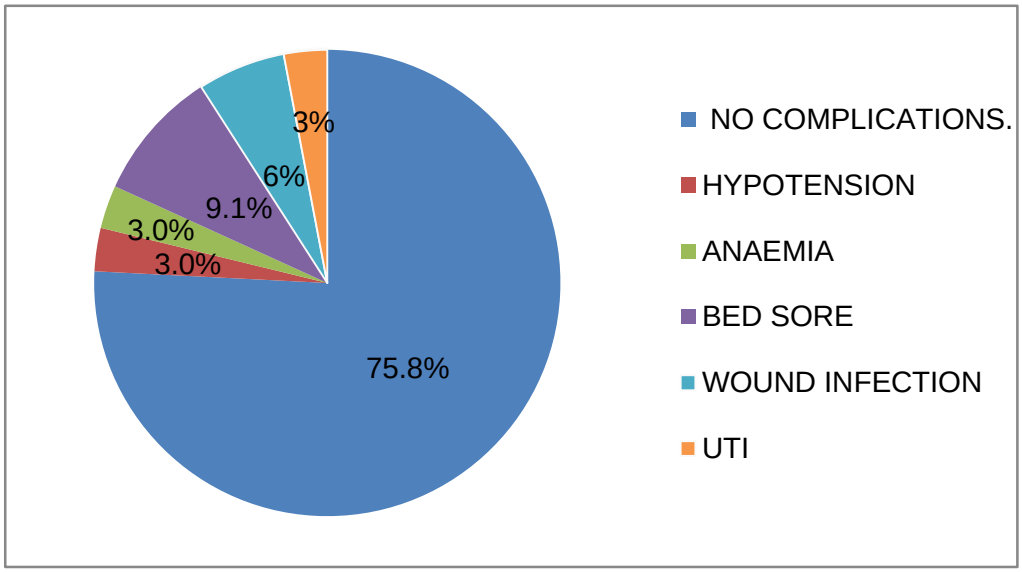


The study revealed that in 59.4% of the subjects, there were no immediate complications post surgery. However in 6.3 % of the subjects, cardiovascular compromise was found. In 9.4% of the subjects, AKI (acute kidney injury) was found. In 9.4% of the subjects, cognitive alteration was noted. Similarly, UTI (urinary tract infections) was found in 9.4% of the subjects respectively.

TABLE 18: DISTRIBUTION OF LATE POST-OP COMPLICATIONS AMONG THE SUBJECTS.

Late Post op	No. of cases	Percentage
ANAEMIA	1	3.0%
BED SORE	3	9.1%
HYPOTENSION	1	3.0%
NO COMPLICATION	25	75.8%
UTI	1	3.0%
WOUND INFECTION	2	6.1%

FIGURE 16: DISTRIBUTION OF LATE POST-OP COMPLICATIONS AMONG THE SUBJECTS

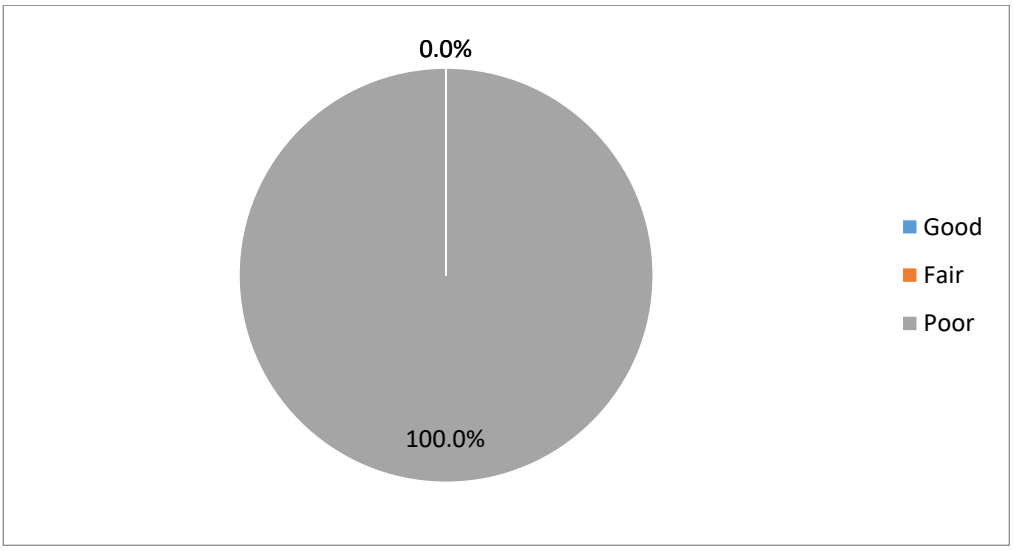


In present study, 24.2 % of the subjects had post-op complications. In 9.1% of the subjects, bedsore was found as one of the post-op complications. Rest of the subjects had complications in the form of anemia, hypotension, wound infection and UTI.

TABLE 19: DISTRIBUTION OF HARRIS HIP SCORE AMONG THE SUBJECTS AT 4-6 WEEKS

HHS AT 4-6 WEEKS	No. of cases	Percentage
Good	0	0.0%
Fair	0	0.0%
Poor	32	100.0%

FIGURE 17: DISTRIBUTION OF HARRIS HIP SCORE AMONG THE SUBJECTS AT 4-6 WEEKS

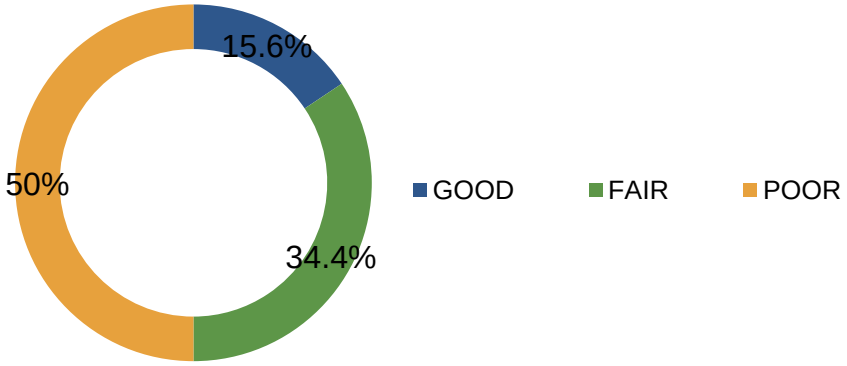


In our study, HHS at 4-6 weeks was found to be poor among all the subjects.

TABLE 20: DISTRIBUTION OF HARRIS HIP SCORE AMONG THE SUBJECTS AT 3-4 MONTHS.

AT 3-4 MONTHS	No. of cases	Percentage
Good	5	15.6%
Fair	11	34.4%
Poor	16	50.0%

FIGURE 18: DISTRIBUTION OF HARRIS HIP SCORE AMONG THE SUBJECTS AT 3-4 MONTHS

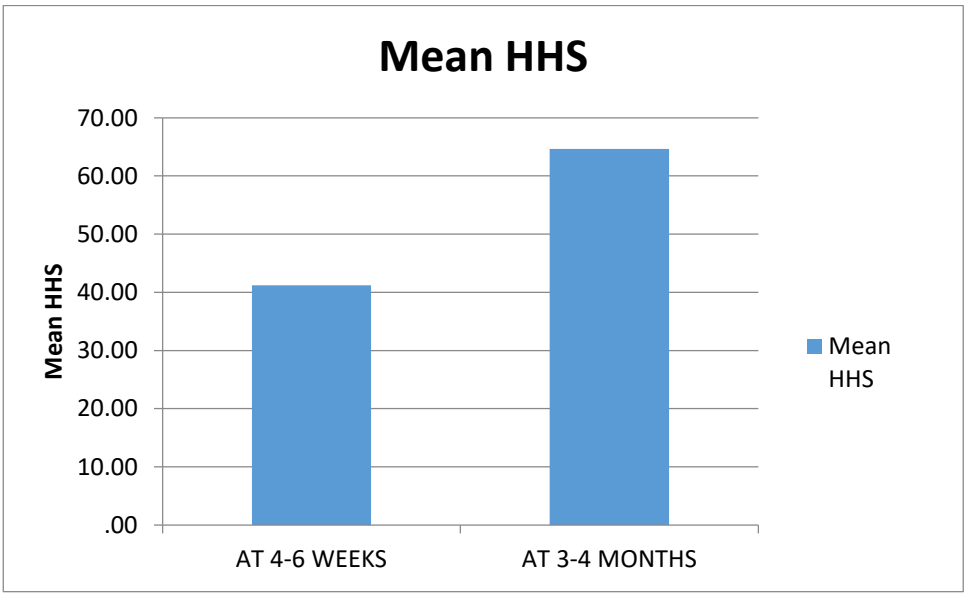


In the present study, it was found that 50% of the subjects had poor HHS at 3-4 months. In 34.4% of the subjects, HHS was fair whereas in 15.6% of the subjects, HHS was good at 3-4 months

TABLE 21: RELATIONSHIP BETWEEN THE HHS AT 4-6 WEEKS & 3-4 MONTHS.

	Mean HHS	Std. Deviation	p-value	Difference	
				Mean	Std. Deviation
AT 4-6 WEEKS	41.19	12.89	0.0001	-23.469	6.154
AT 3-4 MONTHS	64.66	13.35			

FIGURE 19: DISTRIBUTION OF HHS AT 4-6 WEEKS & 3-4 MONTHS

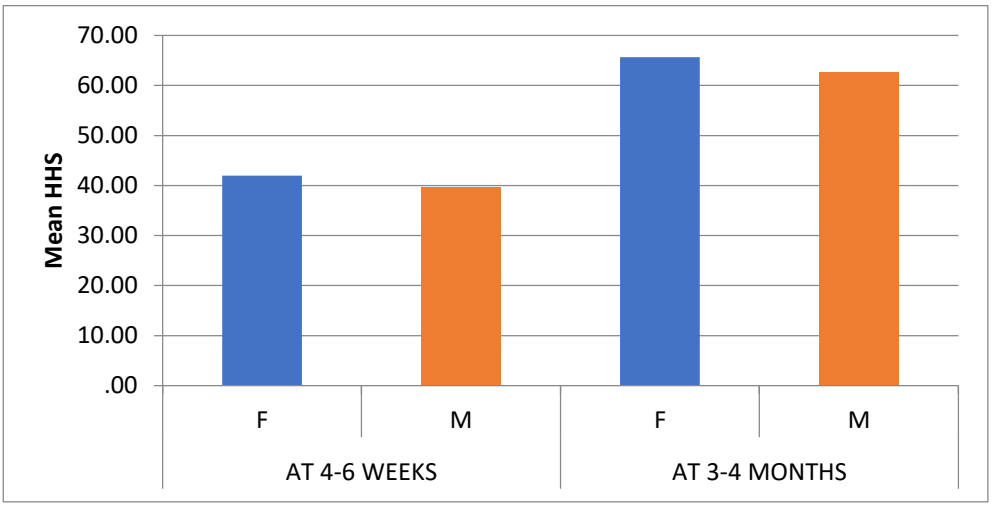


The study found that the mean HHS at 4-6 weeks was found to 41.19 (SD=12.89) and at 3-4 months was found to be 64.66(SD=13.35) and the observed p value found to be 0.0001 which is a significant value

TABLE 22: RELATIONSHIP BETWEEN HARRIS HIP SCORE AND THE GENDER OF THE SUBJECTS AT DIFFERENT TIMELINES.

	SEX	N	Mean HHS	Std. Deviation	Std. Error Mean	t	p-value
AT 4-6 WEEKS	F	21	41.95	11.91	2.60	0.458	0.650
	M	11	39.73	15.09	4.55		
AT 3-4 MONTHS	F	21	65.67	13.12	2.86	0.585	0.563
	M	11	62.73	14.21	4.29		

FIGURE 20: RELATIONSHIP BETWEEN HARRIS HIP SCORE AND THE GENDER OF THE SUBJECTS AT DIFFERENT TIMELINES

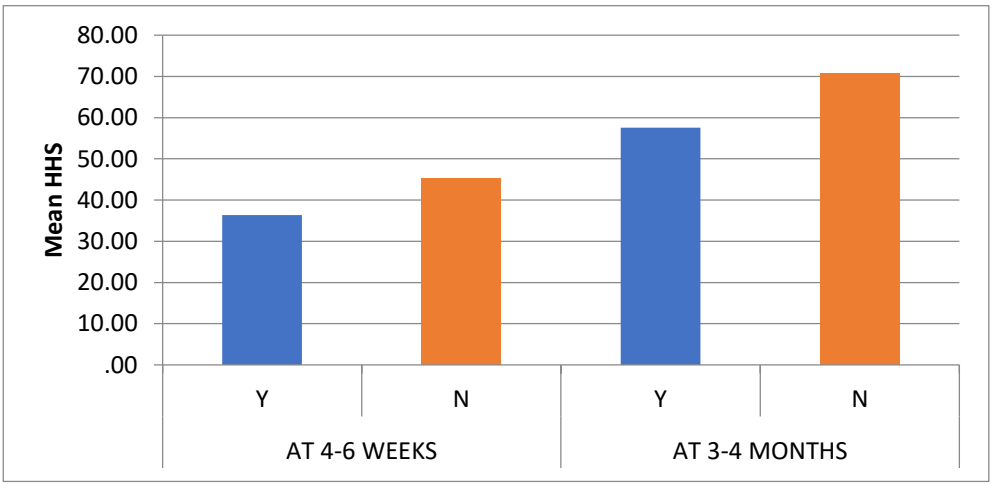


In the present study, it was found that the mean HHS= 41.95 (SD=11.91) in case of females and mean HHS=39.7 (SD=15.09) in case of males at 4-6 weeks. At 3-4 months, HHS in case of females was 65.67 (SD=13.12) and mean= 62.73 (SD=14.21) in case of males at 3-4 months. However, the p value found to be insignificant.

TABLE 23: RELATIONSHIP BETWEEN HHS AND DIABETES MELLITUS TYPE-II AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS.

	Diabetes Mellitus	N	Mean HHS	Std. Deviation	Std. Error Mean	t	p-value
AT 4-6 WEEKS	Y	15	36.40	10.57	2.73	-2.077	0.046
	N	17	45.41	13.55	3.29		
AT 3-4 MONTHS	Y	15	57.60	10.66	2.75	-3.200	0.003
	N	17	70.88	12.57	3.05		

FIGURE 21: RELATIONSHIP BETWEEN HHS AND DIABETES MELLITUS TYPE-II AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS



The study correlates the relationship between HHS and DM type-II at 4-6 weeks. It was found that mean HHS found in patients with H/O DM type-II was 36.40 (SD=10.57) and those without any H/O DM type-II, the mean was found to be 45.41 (SD=13.55). And the observed p value was found to be significant (p value = 0.046). Similarly at 3-4 months, the mean HHS found in patients with and without H/O DM type-II was found to be 57.60 (SD= 10.66) & 70.88 (SD=12.57), respectively. And the observed p value was found to be significant (p value=0.003).

TABLE 24: RELATIONSHIP BETWEEN HHS AND HYPERTENSION AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS.

	Hypertension	N	Mean HHS	Std. Deviation	Std. Error Mean	t	p-value
AT 4-6 WEEKS	Y	11	34.38	10.05	2.79	-2.711	0.011
	N	21	45.84	12.74	2.92		
AT 3-4 MONTHS	Y	11	56.00	11.42	3.17	-3.559	0.001
	N	21	70.58	11.35	2.60		

FIGURE 22: RELATIONSHIP BETWEEN HHS AND HYPERTENSION AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS

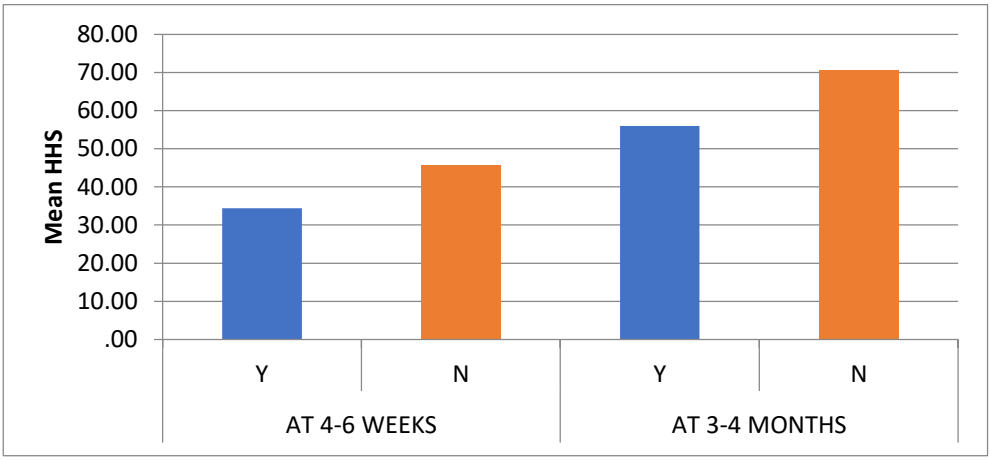
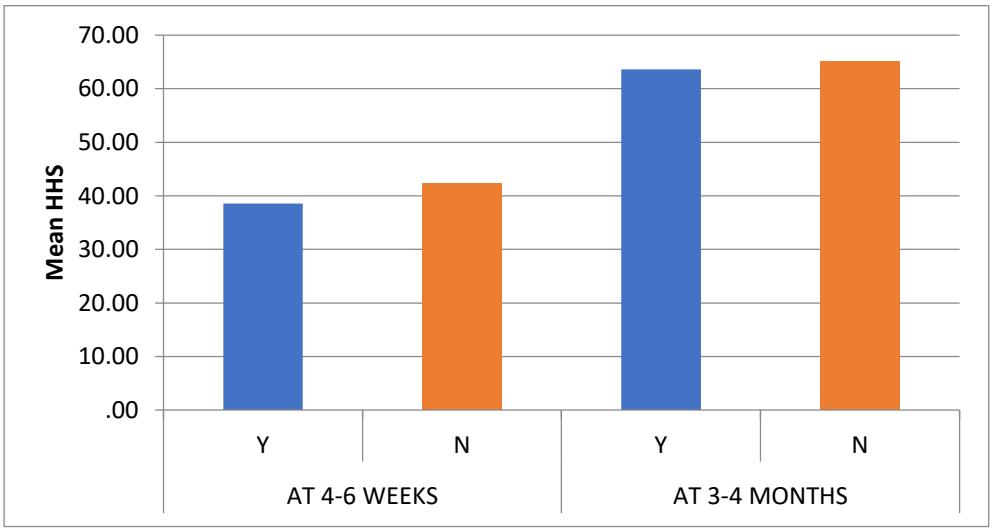


Table 24 and the figure 22 corelates the relationship between HHS and hypertension among the subjects at 4-6 weeks. It was found that mean HHS found in patients with H/O hypertension was 34.38 (SD=10.05) and those without H/O hypertension, the mean was found to be 45.84 (SD=12.74). However, the p value was found to be significant. (p value=0.011) Similarly at 3-4 months, the mean HHS in patients with and without H/O hypertension was found to be 56.00 (SD= 11.42) & 70.58 (SD=11.35), respectively. However, the p value was found to be significant (p value=0.001)

TABLE 25: RELATIONSHIP BETWEEN HHS AND OTHER COMORBIDITIES AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS.

	Others (CKD, stroke, seizures)	N	Mean HHS	Std. Deviation	Std. Error Mean	t	p-value
AT 4-6 WEEKS	Y	10	38.60	9.73	3.08	-0.760	0.453
	N	22	42.36	14.14	3.01		
AT 3-4 MONTHS	Y	10	63.60	10.16	3.21	-0.290	0.768
	N	22	65.14	14.77	3.15		

FIGURE 23: RELATIONSHIP BETWEEN HHS AND OTHER COMORBIDITIES AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS



The study correlates the relationship between HHS and other comorbidities at 4-6 weeks. It was found that mean HHS found in patients with other comorbidities (CKD, stroke, seizures) was 38.60 (SD= 9.73) and those without any other comorbidities, the mean was found to be 42.36 (SD=14.14). And the observed p value was found to be insignificant. (p value = 0.453). Similarly at 3-4 months, the mean HHS found in patients with and without H/O any comorbidities was found to be 63.60 (SD= 10.16) & 65.14 (SD=14.77), respectively. And the observed p value was found to be insignificant (p value=0.168).

TABLE 26: RELATIONSHIP BETWEEN HHS AND CKD AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS.

	CKD	N	Mean HHS	Std. Deviation	Std. Error Mean	t	p-value
AT 4-6 WEEKS	Y	7	36.00	10.36	3.92	-1.214	0.234
	N	25	42.64	13.33	2.67		
AT 3-4 MONTHS	Y	7	59.71	9.66	3.65	-1.112	0.275
	N	25	66.04	14.06	2.81		

FIGURE 24: RELATIONSHIP BETWEEN HHS AND CKD AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS

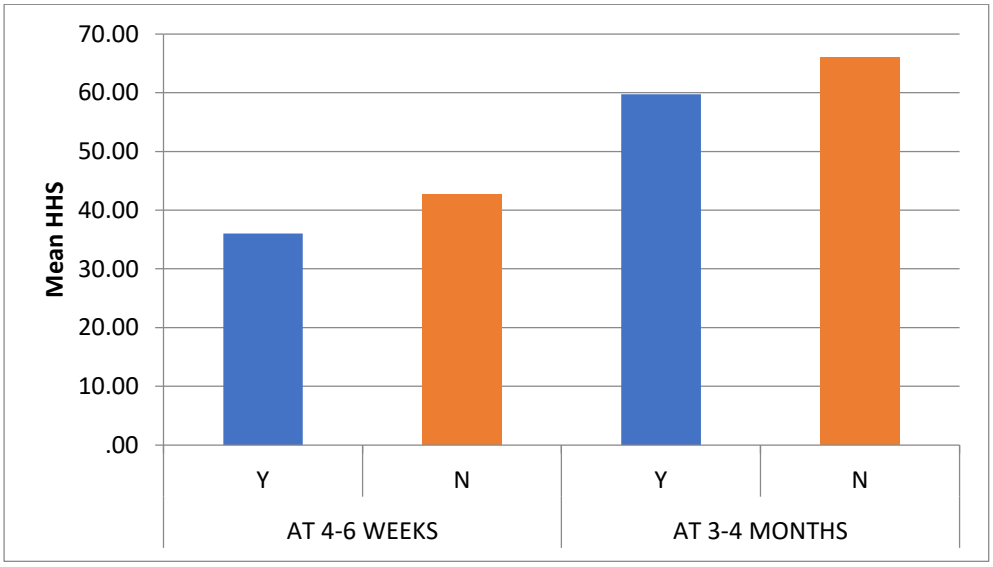
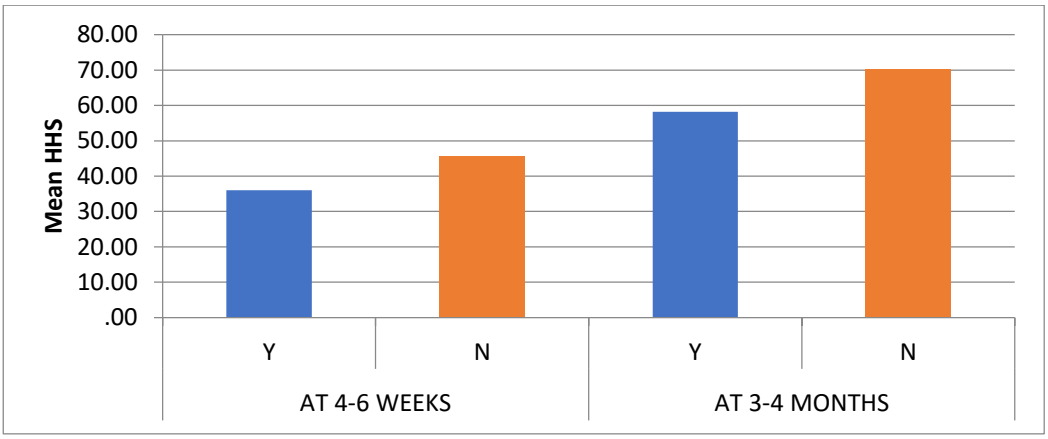


Table 26 and the figure 24 correlates the relationship between HHS and CKD among the subjects at 4-6 weeks. It was found that mean HHS found in patients with H/O CKD was 36.00 (SD=10.36) and those without H/O CKD, the mean was found to be 42.64 (SD=13.33).However the p value was found to be insignificant.(p value=0.234) Similarly at 3-4 months, the mean HHS in patients with and without H/O CKD was found to be 59.71 (SD= 9.66) & 66.04 (SD=14.06), respectively. However, the p value was found to be insignificant (p value=0.275).

TABLE 27: RELATIONSHIP BETWEEN HHS AND PERIOPERATIVE COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS.

	Perioperative COMP	N	Mean HHS	Std. Deviation	Std. Error Mean	t	p-value
AT 4-6 WEEKS	Y	15	36.00	10.63	2.74	-2.457	0.020
	N	17	45.76	13.25	3.21		
AT 3-4 MONTHS	Y	15	58.20	9.49	2.45	-2.370	0.024
	N	17	70.35	13.89	3.37		

FIGURE 25: RELATIONSHIP BETWEEN HHS AND PERIOPERATIVE COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS



The study correlates the relationship between HHS and perioperative complications at 4-6 weeks. It was found that mean HHS found in patients with perioperative complications was 36.00 (SD=10.63) and those without any complications, the mean was found to be 45.76 (SD=13.25). And the observed p value was found to be significant. (p value = 0.020). Similarly at 3-4 months, the mean HHS found in patients with and without post-op complications was found to be 58.20 SD= 9.49) & 70.35 (SD=13.89), respectively. And the observed p value was found to be significant.(p value=0.024)

TABLE 28: RELATIONSHIP BETWEEN HHS AND IMMEDIATE POST-OP COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS.

	immediate post op COMP	N	Mean HHS	Std. Deviation	Std. Error Mean	t	p-value
AT 4-6 WEEKS	Y	13	32.92	12.00	3.33	-3.504	0.001
	N	19	46.84	10.35	2.37		
AT 3-4 MONTHS	Y	13	54.00	10.97	3.04	-4.954	0.000
	N	19	71.95	9.41	2.16		

FIGURE 26: RELATIONSHIP BETWEEN HHS AND IMMEDIATE POST-OP COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS

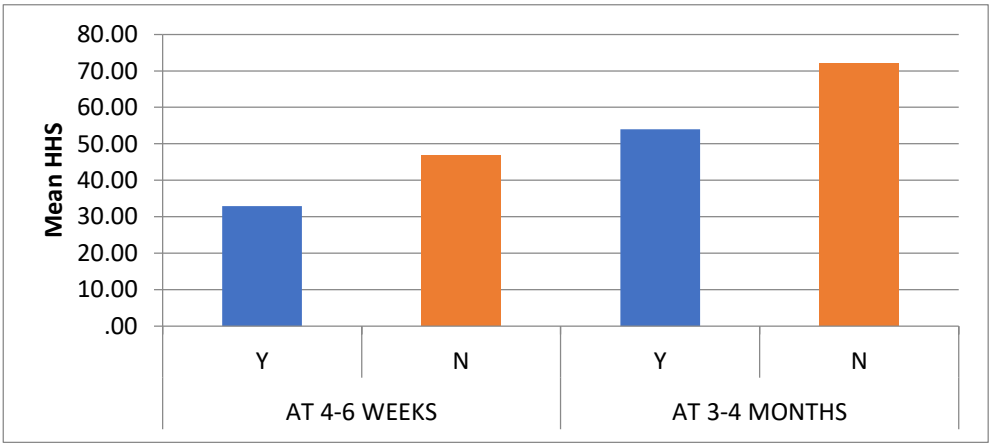
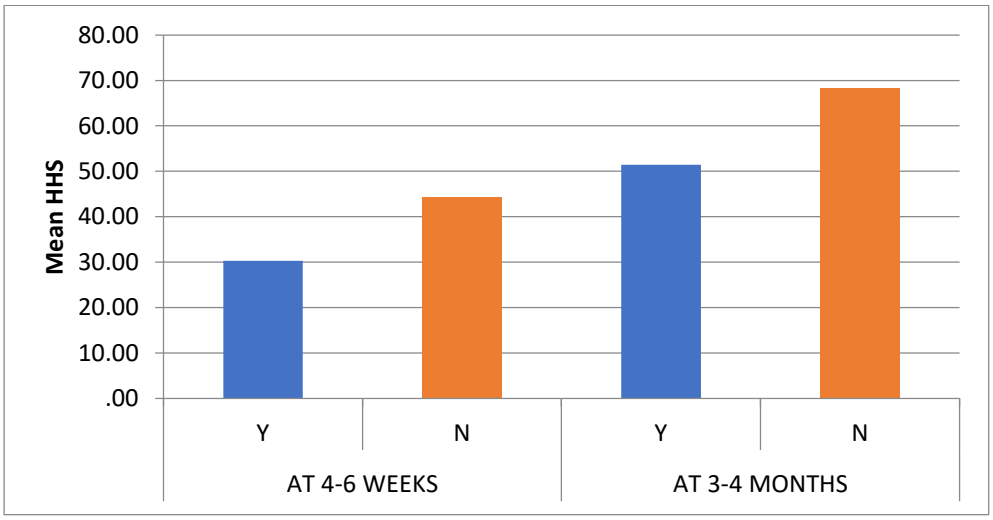


Table 28 and the figure 26 correlates the relationship between HHS and the immediate post-op complications. It was found that mean HHS found in patients with immediate post op complications was 32.92 (SD=12.00) and those without any complications, the mean was found to be 46.84(SD=10.35) and the p value was found to be significant (P=0.001) Similarly at 3-4 months, the mean HHS found in patients with and without post-op complications was found to be 54.00 (SD= 10.97) & 71.95 (SD=9.41), respectively. However the p value was found to be significant.

TABLE 29: RELATIONSHIP BETWEEN HHS AND LATE POST OP COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS.

	Late Post op COMP	N	Mean HHS	Std. Deviation	Std. Error Mean	t	p-value
AT 4-6 WEEKS	Y	7	30.29	9.83	3.71	-2.797	0.009
	N	25	44.24	12.08	2.42		
AT 3-4 MONTHS	Y	7	51.43	10.58	4.00	-3.447	0.002
	N	25	68.36	11.70	2.34		

FIGURE 27: RELATIONSHIP BETWEEN HHS AND LATE POST OP COMPLICATIONS AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS



The study correlates the relationship between HHS and late post op complications at 4-6 weeks. It was found that mean HHS found in patients with late post-op complications was 30.29 (SD= 9.83) and those without any H/O late post-op complications, the mean was found to be 44.24 (SD=12.08). And the observed p value was found to be significant. (p value = 0.009). Similarly at 3-4 months, the mean HHS found in patients with and without H/O DM type-II was found to be 51.43 (SD= 10.58) & 68.36 (SD=11.70), respectively. And the observed p value was found to be significant (p value=0.002).

TABLE 30: RELATIONSHIP BETWEEN HHS & AGE AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS.

	Age	N	Mean HHS	Std. Deviation	95% Confidence Interval for Mean		p-value
					Lower Bound	Upper Bound	
AT 4-6 WEEKS	< 70	11	50.27	10.479	43.23	57.31	0.002
	70-80	16	38.88	9.992	33.55	44.20	
	> 80	5	28.60	13.849	11.40	45.80	
AT 3-4 MONTHS	< 70	11	75.64	8.103	70.19	81.08	0.001
	70-80	16	62.13	9.186	57.23	67.02	
	> 80	5	48.60	14.876	30.13	67.07	

FIGURE 28: RELATIONSHIP BETWEEN HHS & AGE AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS

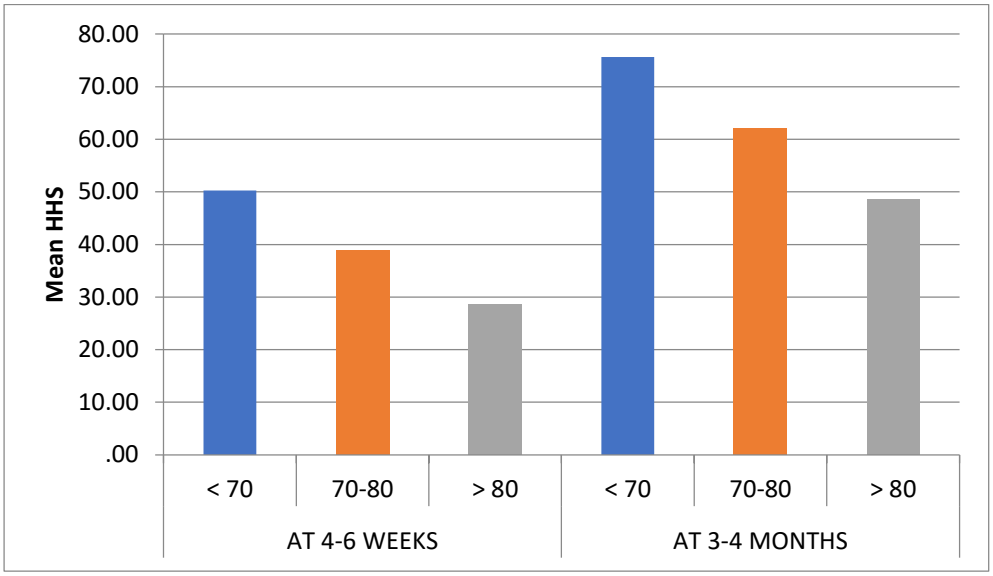
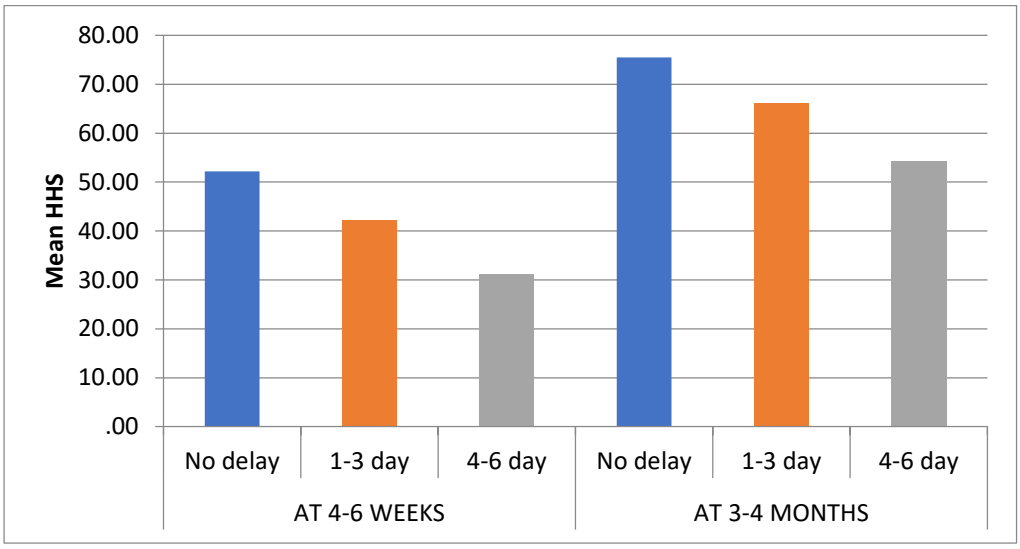


Table 30 and the figure 28 correlates the relationship between HHS and age among the subjects at 4-6 weeks. It was found that mean HHS found in patients with age group <70 years was 50.27 (SD=10.479) and those with age group between 70-80 years, the mean HHS was found to be 38.88 (SD= 9.99) and with the age group >80 years, mean HHS was found to be 28.60 (SD=13.849) which shows the decreasing trend in HHS with increasing age group. And the observed p value was found to be significant.(p value=0.002). Similarly at 3-4 months, the mean HHS in patients of age group <70 years was found to be 75.64(SD= 8.10) ,62.13 (SD=9.18) in 70-80 years age & 48.60(14.87) in >80 years of age. And the p value was found to be significant (p value=0.001).

TABLE 31: RELATIONSHIP BETWEEN HHS AND DELAY IN SURGERY AT 4-6 WEEKS & 3-4 MONTHS.

		N	Mean HHS	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min	Max	F	p-value
	Delay					Lower Bound	Upper Bound				
AT 4-6 WEEKS	No delay	10	52.20	10.053	3.179	45.01	59.39	38	69	12.939	0.001
	1-3 day	10	42.20	8.651	2.736	36.01	48.39	30	58		
	4-6 day	12	31.17	10.170	2.936	24.71	37.63	15	48		
AT 3-4 MONTH	No delay	10	75.50	8.631	2.729	69.33	81.67	56	84	11.795	0.001
	1-3 day	10	66.20	8.337	2.636	60.24	72.16	55	75		
	4-6 day	12	54.33	12.616	3.642	46.32	62.35	30	81		

FIGURE 29: RELATIONSHIP BETWEEN HHS & DELAY IN SURGERY AT 4-6 WEEKS & 3-4 MONTHS

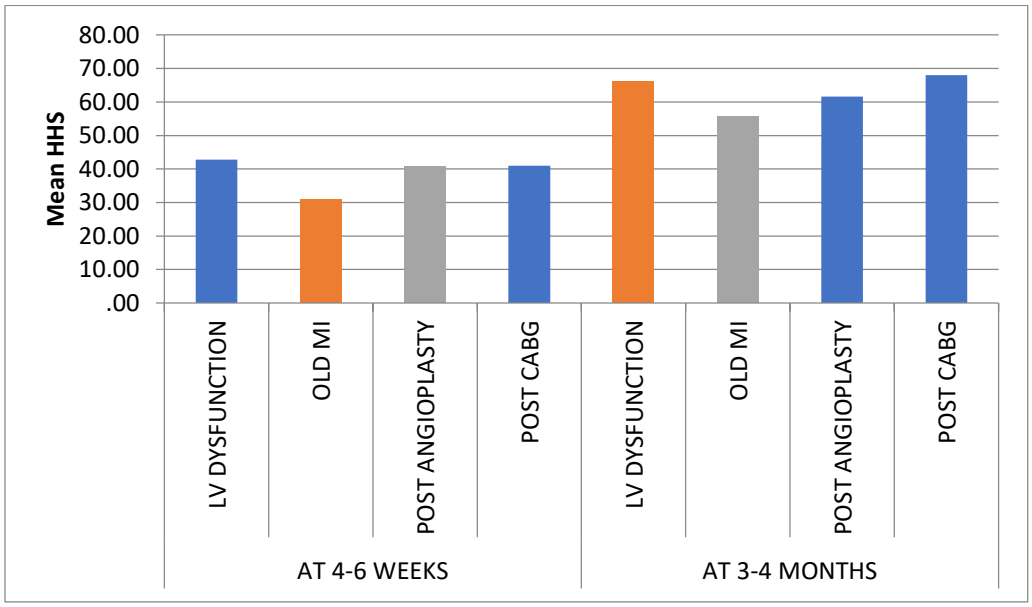


In our study, it was depicted that at 4-6 days mean HHS found in subjects with no delay in surgery was 52.20 (SD=10.05). With delay of 1-3 days, the mean HHS decreased to 42.20 (SD=and 8.65). However, with further delay of 4-6 days, the mean HHS was found to be 31.17(SD=10.17) and the observed p value was found to be significant.(p value=0.001). At 3-4 months, mean HHS was found to be 75.50 (SD=8.63) in subjects with no delay in surgery. With delay of 1-3 days, the mean HHS was found to be 66.20 (SD=8.33). However, after the delay of 4-6 days, the mean HHS was found to be 54.33 (SD=12.61). and the observed p value was found to be significant.(p value=0.001).Thus the study implies that more the delay in surgery, poor is the HHS.

TABLE 32: RELATIONSHIP BETWEEN HHS AND IHD AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS.

		N	Mean HHS	Std. Deviation	95% Confidence Interval for Mean		F	p-value
					Lower Bound	Upper Bound		
AT 4-6 WEEKS	LV DYSFUNCTION	21	42.76	13.878	36.44	49.08	0.711	0.554
	OLD MI	3	31.00	9.000	8.64	53.36		
	POST ANGIOPLASTY	5	40.80	12.133	25.74	55.86		
	POST CABG	3	41.00	9.539	17.30	64.70		
AT 3-4 MONTHS	LV DYSFUNCTION	21	66.19	14.774	59.47	72.92	0.674	0.575
	OLD MI	3	55.67	10.504	29.57	81.76		
	POST ANGIOPLASTY	5	61.60	10.114	49.04	74.16		
	POST CABG	3	68.00	8.888	45.92	90.08		

FIGURE 30: RELATIONSHIP BETWEEN HHS & IHD AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS



In our study, it was depicted that at 4-6 weeks, mean HHS found in patients having LV dysfunction was 42.76 (SD=13.87) (max.) and minimum mean HHS found in patients having an old MI =31.0 (SD=9.0) and P value found to be insignificant (0.554).

At 3-4 months, mean HHS was found to be max. in patients with H/O CABG that is 68 (SD=8.88) and found to be minimum in patients having an old MI that is 55.67 (SD=10.50) and P value found to be insignificant (0.575).

TABLE 33: RELATIONSHIP BETWEEN HHS & EJECTION FRACTION AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS.

					95% Confidence Interval for Mean				
	EF	N	Mean	Std. Deviation	Lower Bound	Upper Bound	Minimum	Maximum	p-value
AT 4-6 WEEKS	< 30	8	28.00	9.971	19.66	36.34	15	45	0.001
	30-50	19	42.84	8.688	38.65	47.03	30	58	
	>50	5	56.00	11.769	41.39	70.61	42	69	
AT 3-4 MONTHS	< 30	8	48.63	9.380	40.78	56.47	30	60	0.001
	30-50	19	67.58	9.112	63.19	71.97	55	81	
	>50	5	79.20	5.891	71.89	86.51	71	84	

FIGURE 31: RELATIONSHIP BETWEEN HHS & EJECTION FRACTION AMONG THE SUBJECTS AT 4-6 WEEKS & 3-4 MONTHS

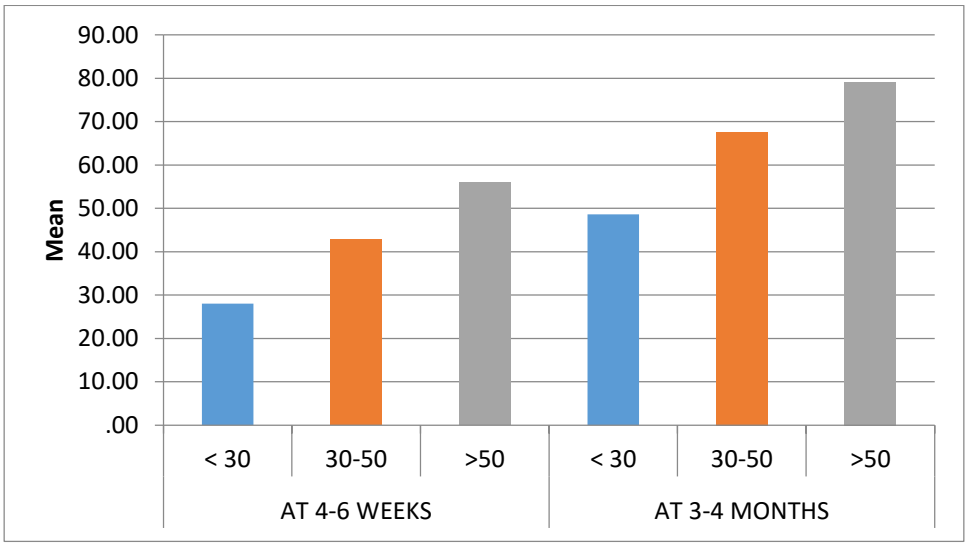


Table 33 and the figure 31 correlates the relationship between HHS and ejection fraction among the subjects at 4-6 weeks. It was found that mean HHS found in patients with EF <30 % was 28(SD=9.971) and those with EF between 30-50 %, the mean HHS was found to be 42.84 (SD=8.688) and with EF >50 % HHS was found to be 56 (SD=11.769) and the observed p value was found to be significant.(p value=0.001). Relationship between HHS and ejection fraction among the subjects at 3-4 months was found that mean HHS found in patients with EF <30 % was 48.63(SD=9.380) and those with EF between 30-50 %, the mean HHS was found to be 67.58 (SD=9.112) and with EF >50 % HHS was found to be 79.20 (SD=5.891) which shows the increasing trend in HHS with increasing ejection fraction and the observed p value was found to be significant.(p value=0.001).

DISCUSSION

The study was conducted to review and analyse the functional outcome of proximal femur fractures in patients with cardiac conditions. A prospective review of the medical records of all cases was taken who underwent surgery between September 2019 and March 2021 at Dayanand Medical college Hospital, Ludhiana was performed. The purpose of the study was to assess the outcome of fracture in patients with cardiac conditions and study the quality of life post discharge.

Demography and clinical characteristics

In our study, we found that majority of the subjects (50%) belonged to age group between 70-80 years. 34.4% of the patients belonged to age group of <70 years and 15.6% of the subjects belonged to >80 years of age. The minimum age of the subject is 40 years and the maximum age is 87 years with the mean age of the subjects as 71 years. As per the study by Santosh L Munde [(72)] the average age of the patients was 77.10 years. The high incidence of intertrochanteric fracture in elderly population reflects high incidence of osteoporosis in these patients. 70% of the patients were in the age group of 70-80 years and 30% patients were in the age group of above 80 years.

Our study represents majority of female subjects with approx. 65.6% and 34.4% of male subjects. Santosh L Munde[(72)] found 57.2% of the male subjects and76.9% of the female subjects were in 70-80 years of age group. Parsurampuriya VK et al[(53)]found that the ratio of women: men range from 2:1 to 8:1 likely because of post-menopausal osteoporosis. Female preponderance is supported by various other western authors. Helfenstein suggested that, by stimulation of osteoclasts due to post-menopausal deficiency of steroid hormones is responsible for greater osteoporosis. A study by Koh et al.[(73)] revealed that hip fracture rates from 1991 to 1998 (per 100 000)were 152 in men and 402 in women; this was respectively1.5 and 5 times higher than corresponding rates in 1960s.Examined by ethnicity, since 1960, the main increase in hip fracture

rates has been seen in Chinese and Malays ,while the rates in the Indian ethnic group appear to have decreased. The factors responsible for these racial differences include differences in the demographic profile, body weight, physical activity, prevalence of cigarette smoking and alcohol consumption, calcium intake, and frequency of falls in the community in elderly.

The study represents that majority of patients had trivial trauma 93.8% with 3.1% of the subjects had the history of fall from height and 3.1% of the subjects had the history of road side accident. Trivial fall attributes to the most common cause of mode of injury in our study. This may be attributed to the fact that the coordination and reaction abilities of the elderly also continue to decline with the increase of age. In this process, the muscle strength and the response of muscles around the hip joint are reduced, which is unable to effectively offset the harmful stress. Similar findings were observed in a study by Rathore et al [(50)] where the major cause of injury was fall (87.5%) which comprised primarily of the people from 60-80 years of age and only in 12.5% it was due to road traffic accident.

In our study, most of the patients 62.5% were found in Type-III Boyd & Griffin Classification. Minimum no. of patients were found in Type-IV Boyd & Griffin classification. Approximately 34.4% patients were found in type-II classification.

COMORBIDITIES

Hypertension

In our study, 40.6 % of the subjects that is 13 subjects out of 32 subjects had the history of hypertension. It is still necessary for us to recognize that the incidence of hip fractures in the elderly may be related to dizziness caused by hypertension. A study by Zhang et al,[(74)] the result showed that the hip fracture group with hypertension (61.6%) is similar to the non-hip

fracture group (62.2%), and there is no significant statistical significance in the univariate or multivariate analysis.

Diabetes

In our study, 46.9% patients had H/O DM type-II attributing more than half of the patients with DM II. In a review by Khazai et al[75], higher risk of fractures in patients with type 1 and type 2 diabetes , especially at the hip. Studies have shown an association between advanced glycation end products with increased fracture risk in diabetics. These studies support the hypothesis of poor glycemic control and chronic hyperglycemia having a direct detrimental effect on bone quality. Diabetes is associated with a higher risk of falls. Diabetic neuropathy and neuromuscular impairment have been shown to be a major risk factor for falls. Furthermore diabetic neuropathy may lead to falls that are more severe and falls that are sideways, as opposed to forward or backward. Both of these fall characteristics have been associated with a greater risk of fractures.

Cardiac conditions

In our study, all the patients had cardiac comorbidities. LV dysfunction found to be the most common attribute to IHD. Current study found that majority of the patients 65.6% had LV dysfunction. 9.4% of the patients had an old MI. Thus our study attributes LV dysfunction as the most common attribute to IHD. The presence of cardiac comorbidities affected significantly the HHS in patients with intertrochanteric fracture.

According to the study by Xu B, Han L, Liu H, et al [42], the occurrence rate of hip fracture is 53% higher among older in patients with a diagnosis of CVD than those without (RR = 1.53, 95% CI 1.47–1.60). Those with hip fracture were more likely to have hypertensive or cerebrovascular disease, with the risk ranging from 1.34 to 1.70.

Harris Hip Score

In our study, the mean HHS at 4-6 weeks is 41.19 (SD 12.89).

At 3-4 months, the mean HHS at 3-4 months is 64.66 (SD 13.35). In a study by Shakeel et al [76], an intergroup comparison of HHS between PFN

and DHS group revealed post operatively after 3 month the Harris hip score in PFN group had mean value 57.33 (SD 2.10), while the HH score in DHS group had mean 51.90 (SD 0.96.). Thus our study had the similar findings of poor HHS as that of Shakeel at 3 months period. Similar findings were obtained in a study conducted by Ranjeetesh et al.[19] In a study by Rathore Et al[50], patients were evaluated according to HHS at varying intervals throughout the recovery period and final scoring was done at minimum one year follow up. There were maximum patients in excellent to good results range (73% patients). 18% patients had a fair outcome, 7.7% had poor and 2% patients had very poor outcome.

In our study, it was found that 50% of the subjects had poor HHS at 3-4 months. In 34.4% of the subjects, HHS was fair whereas in 15.6% of the subjects, HHS was good at 3-4 months. Santosh L Munde [72] et al observed Harris Hip score for assessing the final outcome of patients. The total score was 100, with outcome graded as excellent, good, fair and poor. The mean Harris hip score at 6th month follow up was75.30 ±27.22 with p value as0.001. In our study, the mean HHS was found to be 64.66 (SD=13.35) with p value as 0.0001. Yadav et al., (2016)[77] compared dynamic hip screw & proximal femoral nail in treatment of intertrochanteric fracture in a prospective randomized study for management of intertrochanteric fracture treated by dynamic hip screw & proximal femur nail in 60 cases. At 2 weeks mean Harris score was 49.30 in DHS group and 57.03 in PFN group. At 6 weeks mean Harris score was 68.79 in DHS group and 71.49 in PFN group. At 3 months mean Harris score was 75.73 in DHS group and 78.04 in PFN group. To test whether this difference is statistically significant or not Chi-square test was applied as test of significance. Chi square value worked out to be 0.15 which was statistically not significant (P>0.05).

Delay in surgery

In a study by Klestil T et al.,[58] it was observed that In elderly patients sustaining hip fracture, early surgery is associated with reduced mortality

and perioperative complications. Patients operated on within 48 hours had a 20% lower 1-year mortality. Simunovic et al.[78] showed that early surgery (within 24 to 72 hours) can reduce the risk of all-cause mortality in patients aged 60 or older by 19% (risk ratio (RR) 0.81, 95% confidence interval (CI) 0.68–0.96)32. Early surgery was also associated with a reduction of pressure ulcers and postoperative pneumonia (RR 0.48, 95% CI 0.34-0.69)32. These studies coincide with findings in our study that the delay in surgery is related to the poor HHS hence poor outcome.

Complications

Our study revealed that in 59.4% of the subjects, there were no immediate complications post surgery. However in 6.3 % of the subjects, cardiovascular compromise was found. In 9.4% of the subjects, AKI (acute kidney injury) was found. In another 9.4% of the subjects, cognitive alterations was noted. Similarly, UTI (urinary tract infections) was found in 9.4% of the subjects respectively. In a review by Carpintero P et al[60], various complications were explained in the elderly patients after hip fracture surgery. Cognitive alterations were found in 10% of the patients, cardiac and vascular complications were found in 35-42% of the subjects. The prevalence of perioperative anemia in hip fractured patients ranged from 24% to 44%.

SUMMARY & CONCLUSION

The present study was a single arm randomised control trial conducted at the Department of Orthopaedics, Dayanand Medical College, Ludhiana. The study included patients with intertrochanteric fracture of femur with cardiac conditions who were analysed under a period of 3-4 months to review and analyse the functional outcome of proximal femur fractures. A prospective review of the medical records of 32 cases who underwent surgery at Dayanand Medical college Hospital, Ludhiana was performed. Patients were selected with proximal femur fracture with cardiac conditions after fulfilling the inclusion and exclusion criteria. After taking detailed history and examination, the patients were followed up after 4-6 weeks and 3-4 months. A detailed structured performa was filled and functional assessment was done using HHS (Harris hip score).

For comparing data, probability value (p value) less than 0.05 was considered statistically significant.

The salient results of the study were:

- Majority of the subjects (50%) belonged to age group between 70-80 years.
- The minimum age of the subject is 40 years and the maximum age is 87 years with the mean age of the subjects as 71 years.
- The study represents majority of female subjects with approx. 65.6% and 34.4% of male subjects.
- Trivial fall attributes to the most common cause of mode of injury in our study.
- Most of the patients 62.5% were found in Type-III Boyd & Griffin Classification.

- 40.6 % of the subjects that is 13 subjects out of 32 subjects had the history of hypertension.
- 46.9% patients had the H/O DM type-II and 53.1% of the patients had no H/O DM Type II
- The study showed that 22.6 % of the patients had CKD with 3.2% of the patients had pulmonary TB and H/O stroke.
- Majority of the patients 65.6% had LV dysfunction. Our study attributes LV dysfunction as the most common attribute to IHD followed by angioplasty.
- Our study found 87.5% subjects took anti platelet agent before admission.
- Our study showed that hospital stay was prolonged in 65.6% of the total subjects.
- In our study, it was found that 31.3% of the subjects, surgery was delayed by <3 days. In 37.5% of the subjects , surgery was delayed by >3 days. However in 31.3 % of the subjects, surgery was not delayed.
- Our study found that most common cause of delay in surgery was the intake of anti platelet agent (tab Clopidogrel), found in 37.5 % of the subjects. Similarly other causes which added onto delay in surgery were found to be uncontrolled diabetes, hypertension, hypotension, hyponatremia, hyperkalemia, AKI, desaturation, etc.
- The study revealed that 25% of the subjects had EF less than 30%, 59.4% of the subjects had EF between 30-50%, 15.6% of the subjects had EF >50%.

- In present study, 24.2 % of the subjects had post-op complications. In 9.1% of the subjects , bedsore was found as one of the post-op complications. Rest of the subjects had complications in the form of anemia, hypotension, wound infection and UTI.

- In our study ,the minimum HHS was 40 (poor) and the maximum HHS was 87 (good). HHS at 4-6 weeks was found to be poor among all the subjects. At 3-4 months follow up, 50% of the subjects had poor HHS. In 34.4% of the subjects , HHS was fair whereas in 15.6% of the subjects, HHS was good at 3-4 months.

- The mean HHS at 4-6 weeks & 3-4 months is 41.19 & 64.66 , respectively.

- In 40.6 % of the patient's , immediate post op complications were found in the form of AKI, cardiovascular compromise, cognitive alterations, UTI.

- Perioperative complications were found in 46.9 % of the patients in the form of anaemia, cardiac complications, cardiac compromise, difficulty in reduction, and hyponatremia.

- In the present study, it was found that the mean HHS in case of females {41.95 (SD=11.91)} is more than males {39.7 (SD=15.09)} at 4-6 weeks.

- At 3-4 months , mean HHS in case of females { 65.67 (SD=13.12)} is more than that of males { mean= 62.73 (SD=14.21)} at 3-4 months. However , the p value found to be insignificant.

- The study found that mean HHS was higher in patients with no immediate post op complications than those with complications on follow up at 4-6 weeks & 3-4 months. The p value was found to be

significant (P=0.001). Similar results were obtained in mean HHS in patients with perioperative complications.

- Study observed that at 4-6 weeks, mean HHS found in patients with H/O DM type-II was 36.40 (SD=10.57) and those without any H/O DM type-II , the mean was found to be 45.41 (SD=13.55). And the observed p value was found to be significant. (p value = 0.046). Thus the study shows that HHS was found to be lower in patients with DM type -II.

- Similarly at 3-4 months, the mean HHS found in patients with and without H/O DM type-II was found to be 57.60 (SD= 10.66) & 70.88 (SD=12.57), respectively. And the observed p value was found to be significant (p value=0.003).

- Study found that at 4-6 weeks, mean HHS found in patients with H/O hypertension was 34.38 (SD=10.05) and those without H/O hypertension , the mean was found to be 45.84 (SD=12.74). It thus revealed that HHS is higher in patients without H/O hypertension. And the p value was found to be significant.(p value=0.011)

- Similarly at 3-4 months, the mean HHS in patients with and without H/O hypertension was found to be 56.00 (SD= 11.42) & 70.58 (SD=11.35), respectively. However the p value was found to be insignificant (p value=0.001).

- In our study, it was found that at 4-6 weeks mean HHS found in patients with other comorbidities (CKD, stroke, seizures) was 38.60 (SD=9.73) and those without any other comorbidities , the mean was found to be 42.36 (SD=14.14). Thus shows that comorbidities lower the value of HHS.

- It was observed that at 4-6 weeks , mean HHS found in patients with H/O CKD was 36.00 (SD=10.36) and those without H/O CKD , the mean was found to be 42.64 (SD=13.33) which again reveals the trend of low value of HHS in case of comorbidities.

- Similarly at 3-4 months, the mean HHS in patients with and without H/O CKD was found to be 59.71 (SD= 9.66) & 66.04 (SD=14.06), respectively. However the p value was found to be insignificant (p value=0.275).

- The study established that at 4-6 weeks , mean HHS found in patients with late post-op complications was 30.29 (SD=9.83) and those without any H/O late post-op complications, the mean was found to be 44.24 (SD=12.08). And the observed p value was found to be significant. (p value = 0.009). Thus it proved that more the post-op complications, lower the HHS.

- Similarly at 3-4 months, the mean HHS found in patients with and without H/O DM type-II was found to be 51.43 (SD= 10.58) & 68.36 (SD=11.70), respectively. And the observed p value was found to be significant (p value=0.002).

- The study observed that at 4-6 weeks , the mean HHS found in patients with age group <70 years was 50.27 (SD=10.479) and those with age group between 70-80 years , the mean HHS was found to be 38.88 (SD=9.99) and with the age group >80 years, mean HHS was found to be 28.60 (SD=13.849) which shows the decreasing trend in HHS with increasing age group and the observed p value was found to be significant.(p value=0.002).

- Similarly at 3-4 months, the mean HHS in patients of age group <70 years was found to be 75.64(SD= 8.10), 62.13 (SD=9.18) in 70-80

years age & 48.60(14.87) in >80 years of age. And the p value was found to be significant (p value=0.001).

- In our study, it was depicted that at 4-6 days mean HHS found in subjects with no delay in surgery was 52.20 (SD=10.05). With delay of 1-3 days, the mean HHS decreased to 42.20 (SD=and 8.65). However, with further delay of 4-6 days, the mean HHS was found to be 31.17(SD=10.17) and the observed p value was found to be significant.(p value=0.001).

- The study noticed that at 3-4 months, mean HHS was found to be 75.50 (SD=8.63) in subjects with no delay in surgery. With delay of 1-3 days, the mean HHS was found to be 66.20 (SD=8.33). However after the delay of 4-6 days, the mean HHS was found to be 54.33(SD=12.61).Thus the study implies that more the delay in surgery, poor is the HHS.

- In our study, it was depicted that at 4-6 weeks, mean HHS found in patients having LV dysfunction was 42.76 (SD=13.87) (max.) and minimum mean HHS found in patients having an old MI =31.0 (SD=9.0).

- At 3-4 months, mean HHS was found to be max. in patients with H/O CABG that is 68 (SD=8.88) and found to be minimum in patients having an old MI that is 55.67 (SD=10.50).

- The relationship between HHS and ejection fraction among the subjects at 4-6 weeks. It was found that mean HHS found in patients with EF <30 % was 28(SD=9.971) and those with EF between 30-50 %, the mean HHS was found to be 42.84 (SD=8.688) and with EF >50 % HHS was found to be 56 (SD=11.769) and the observed p value was found to be significant.(p value=0.001).

- Relationship between HHS and ejection fraction among the subjects at 3-4 months was found that mean HHS found in patients with EF <30 % was 48.63(SD=9.380) and those with EF between 30-50 %, the mean HHS was found to be 67.58 (SD=9.112) and with EF >50 % HHS was found to be 79.20 (SD=5.891) which shows the increasing trend in HHS with increasing ejection fraction and the observed p value was found to be significant.(p value=0.001).

CONCLUSION

Hip fracture is a common and debilitating injury requiring hospital admission. Patients with hip fracture with a diagnosis of CVD, have greater risk of hip fracture with longer length of hospital stay and hence higher cost per hospital stay. Presence of more comorbidities along with CVD shows a significant association in the functional outcome.

Effective prevention for falling for older patients with CVD, screening of osteoporosis, control of hypertension with proper physical activity and improved nutrition could be important strategies for reducing the increased occurrence of hip fracture.

LIMITATIONS OF THE STUDY

1. The data is limited to the hospitalised patients only who were admitted in the tertiary care hospital and the findings may not be generalised to the entire population of patients.
2. The sample size of the study population was small.
3. Despite the quality controls, the hospital data are still subject to measurement errors due to incomplete or inaccurately recorded information.
4. There is also possibility of misclassification of disease especially of some subtypes of cardiovascular disease.

BIBLIOGRAPHY

1. Guerra MTE, Giglio L, Morais JMM, Labatut G, Feijó MC, Kayser CEP. The Relationship between the Lee Score and Postoperative Mortality in Patients with Proximal Femur Fractures. Rev Bras Ortop (Sao Paulo). 2019;54:387-91.
2. Al-yassari G, Langstaff RJ, Jones JW, Al-Lami M. The AO/ASIF proximal femoral nail (PFN) for the treatment of unstable trochanteric femoral fracture. Injury. 2002;33:395-9.
3. Mittal A, Gill SP, Kumar D, Singh J, Kumar H, Rajput A. Early Functional Outcome of Osteoporotic Intertrochantric Fractures in Elderly Managed with Proximal Femoral Nail and Proximal Femoral Nail Antirotation: A Comparative Study. MAMC J Med Sci 2021;7:63-71.
4. Baixauli F, Vicent V, Baixauli E, Serra V, Sánchez-Alepuz E, Gómez V, et al. A reinforced rigid fixation device for unstable intertrochanteric fractures. Clin Orthop Relat Res. 1999;361:205-15.
5. Ahrengart L, Törnkvist H, Fornander P, Thorngren KG, Pasanen L, Wahlström P, et al. A randomized study of the compression hip screw and Gamma nail in 426 fractures. Clin Orthop Relat Res. 2002;401:209-22.
6. George ST, Rai BK, Mannem A. Trochantric severity score a useful tool to assess outcomes after intertrochantric fractures. Journal of Orthopaedics and Allied Sciences. 2017;5:35-9.
7. Zuckerman JD. Hip fracture. N Engl J Med. 1996;334(23):1519-25.
8. Fox KM, Magaziner J, Hebel JR, Kenzora JE, Kashner TM. Intertrochanteric versus femoral neck hip fractures: differential characteristics, treatment, and sequelae. J Gerontol A Biol Sci Med Sci. 1999;54(12):M635-40.
9. Guyton JL. Fractures of hip, acetabulum, and pelvis. In: Canale ST, editor. Campbell’s operative orthopaedics. 9th ed. St. Louis: Mosby; 1998:2181-276.

10. Cummings SR, Nevitt MC, Browner WS, Stone K, Fox KM, Ensrud KE, et al. Risk factors for hip fracture in white women. Study of Osteoporotic Fractures Research Group. N Engl J Med. 1995;332(12):767-73.
11. Hernandez-Avila M, Colditz GA, Stampfer MJ, Rosner B, Speizer FE, Willett WC. Caffeine, moderate alcohol intake, and risk of fractures of the hip and forearm in middle-aged women. Am J Clin Nutr. 1991;54(1):157-63.
12. Paganini-Hill A, Chao A, Ross RK, Henderson BE. Exercise and other factors in the prevention of hip fracture: the Leisure World study. Epidemiology. 1991;2(1):16-25.
13. Farmer ME, Harris T, Madans JH, Wallace RB, Cornoni-Huntley J, White LR. Anthropometric indicators and hip fracture. The NHANES I epidemiologic follow-up study. J Am Geriatr Soc. 1989;37(1):9-16.
14. Finsen V, Benum P. The second hip fracture. An epidemiologic study. Acta Orthop Scand. 1986;57(5):431-3.
15. Ray WA, Griffin MR, Downey W. Benzodiazepines of long and short elimination half-life and the risk of hip fracture. JAMA. 1989;262(23):3303-7.
16. Gates B, Fairbairn A, Craxford AD. Broken necks of the femur in a psychogeriatric hospital. Injury. 1986;17(6):383-6.
17. Niemann KM, Mankin HJ. Fractures about the hip in an institutionalizedpatient population. II. Survival and ability to walk again. J Bone Joint Surg Am. 1968;50(7):1327-40.
18. McGrory BJ. Stinchfield resisted hip flexion test. Hosp Physician 1999;35(9):41–2.
19. Kumar R, Singh RN, Singh BN. Comparative prospective study of proximal femoral nail and dynamic hip screw in treatment of intertrochanteric fracture femur. J Clin Orthop Trauma. 2012;3(1):28-36.

20. Gullberg B, Johnell O, Kanis JA. World-wide projections for hip fracture. Osteoporos Int. 1997;7(5):407-13.
21. Melton LJ 3rd, Kearns AE, Atkinson EJ, Bolander ME, Achenbach SJ, Huddleston JM, et al. Secular trends in hip fracture incidence and recurrence. Osteoporos Int. 2009;20(5):687-94.
22. Kyle RF, Gustilo RB, Premer RF. Analysis of six hundred and twenty-two intertrochanteric hip fractures. J Bone Joint Surg Am. 1979;61(2):216-21.
23. Baumgaertner MR, Curtin SL, Lindskog DM, Keggi JM. The value of the tip-apex distance in predicting failure of fixation of peritrochanteric fractures of the hip. J Bone Joint Surg Am. 1995;77(7):1058-64.
24. Lindskog DM, Baumgaertner MR. Unstable intertrochanteric hip fractures in the elderly. J Am Acad Orthop Surg. 2004;12(3):179-90.
25. Kaufer H. Mechanics of the treatment of hip injuries. Clin Orthop Relat Res. 1980;(146):53-61.
26. Tankó LB, Christiansen C, Cox DA, Geiger MJ, McNabb MA, Cummings SR. Relationship between osteoporosis and cardiovascular disease in postmenopausal women. Journal of Bone and Mineral Research. 2005;20:1912-20.
27. Stehman-Breen CO, Sherrard DJ, Alem AM, Gillen DL, Heckbert SR, Wong CS, et al. Risk factors for hip fracture among patients with end-stage renal disease. Kidney Int. 2000;58(5):2200-5.
28. Grisso JA, Kelsey JL, Strom BL, Chiu GY, Maislin G, O'Brien LA, et al. Risk factors for falls as a cause of hip fracture in women. The Northeast Hip Fracture Study Group. N Engl J Med. 1991;324(19):1326-31.
29. Dennison E, Mohamed MA, Cooper C. Epidemiology of osteoporosis. Rheum Dis Clin North Am. 2006;32(4):617-29.
30. Kanis J, Oden A, Johnell O. Acute and long-term increase in fracture risk after hospitalization for stroke. Stroke. 2001;32(3):702-6.

31. Holroyd C, Cooper C, Dennison E. Epidemiology of osteoporosis. Best Pract Res Clin Endocrinol Metab. 2008;22(5):671-85.
32. Strandberg TE. Cardiovascular disease, hypertension, and risk of hip fracture. JAMA. 2010;303(8):731; author reply 731-2.
33. Cappuccio FP, Meilahn E, Zmuda JM, Cauley JA. High blood pressure and bone-mineral loss in elderly white women: a prospective study. Study of Osteoporotic Fractures Research Group. Lancet. 1999;354(9183):971-5.
34. Koval KJ, Zuckerman JD. Hip Fractures: II. Evaluation and Treatment of Intertrochanteric Fractures. J Am Acad Orthop Surg. 1994;2(3):150-156.
35. Kasser JR, editor. Orthopaedic knowledge update 5–home study syllabus. Rosemont (IL): American Academy of Orthopaedic Surgeons; 1996.
36. Sonawane DV. Classifications of intertrochanteric fractures and their clinical importance. Trauma Int. 2015;1(1):7-11.
37. van Embden D, Rhemrev SJ, Meylaerts SA, Roukema GR. The comparison of two classifications for trochanteric femur fractures: the AO/ASIF classification and the Jensen classification. Injury. 2010 Apr 1;41(4):377-81.
38. Praveen D. A modified dynamic hip screw in unstable intertrochanteric fracture: A retro-prospective study (Doctoral dissertation, PSG Institute of Medical Sciences and Research, Coimbatore).
39. Voo L, Armand M, Kleinberger M. Stress fracture risk analysis of the human femur based on computational biomechanics. Johns Hopkins APL Tech Dig. 2004 Jul 1;25(3):223-30.
40. Kain MS, Tornetta P. Hip dislocations and fractures of the femoral head. In: Court-brown CM, Heckman JD, Mcqueen MM (editor) Rockwood and Green's Fractures in adults. Eighth edn, Vol 2. Library of congress cataloging-in-publication; Philadelphia: 2015. p. 1983-2026.

41. Cheng YX, Sheng X. Optimal surgical methods to treat intertrochanteric fracture: a Bayesian network meta-analysis based on 36 randomized controlled trials. Journal of Orthopaedic surgery and research. 2020 Dec;15(1):1-4.
42. Xu B, Han L, Liu H, Wang J, Bao XY, Xi HX, et al. Cardiovascular disease and hip fracture among older inpatients in Beijing, China. Biomed Res Int. 2013;2013:493696.
43. Marks R. Hip fracture epidemiological trends, outcomes, and risk factors, 1970-2009. Int J Gen Med. 2010;3:1-17.
44. Sennerby U, Melhus H, Gedeborg R, Byberg L, Garmo H, Ahlbom A, et al. Cardiovascular diseases and risk of hip fracture. JAMA. 2009;302(15):1666-73.
45. Gerber Y, Melton LJ 3rd, McNallan SM, Jiang R, Weston SA, Roger VL. Cardiovascular and noncardiovascular disease associations with hip fractures. Am J Med. 2013;126(2):169.e19-26.
46. Heaney RP, Valent DJ, Barton IP. Hospitalization-related bone loss and the protective effect of risedronate. Osteoporosis international. 2006;17:212-6. .
47. Bagger YZ, Tankó LB, Alexandersen P, Qin G, Christiansen C. Prospective Epidemiological Risk Factors Study Group. Radiographic measure of aorta calcification is a site-specific predictor of bone loss and fracture risk at the hip. J Intern Med. 2006;259(6):598-605.
48. Schulz E, Arfai K, Liu X, Sayre J, Gilsanz V. Aortic calcification and the risk of osteoporosis and fractures. J Clin Endocrinol Metab. 2004;89(9):4246-53.
49. Sennerby U, Farahmand B, Ahlbom A, Ljunghall S, Michaëlsson K. Cardiovascular diseases and future risk of hip fracture in women. Osteoporos Int. 2007;18(10):1355-62.
50. Rathore LP, Gupta L, Thakur S, Vaidya S, Sharma D, Sharma A. Treatment of stable and unstable intertrochanteric fractures using proximal femoral nail and their functional assessment using modified

Harris hip score. International Journal of Research in Orthopaedics. 2019;5(1):162-6.

51. Haleem S, Lutchman L, Mayahi R, Grice JE, Parker MJ. Mortality following hip fracture: trends and geographical variations over the last 40 years. Injury. 2008;39(10):1157-63.
52. Cummings SR, Nevitt MC. A hypothesis: the causes of hip fractures. J Gerontol. 1989;44(4):M107-11.
53. Parsurampuriya VK, Siddiqui SM, Kumar R, Jacob RV. Comparative study of management of intertrochanteric fracture by dynamic hip screw and proximal femoral nailing. Int J Res Orthop. 2021;7:487-92.
54. Bhandari M, Koo H, Saunders L, Shaughnessy SG, Dunlop RB, Schemitsch EH. Predictors of in-hospital mortality following operative management of hip fractures. Int J Surg Investig. 1999;1(4):319-26.
55. Sanz-Reig J, Salvador Marín J, Ferrández Martínez J, Orozco Beltrán D, Martínez López JF, Quesada Rico JA. Prognostic factors and predictive model for in-hospital mortality following hip fractures in the elderly. Chin J Traumatol. 2018;21(3):163-169.
56. Cullen MW, Gullerud RE, Larson DR, Melton LJ 3rd, Huddleston JM. Impact of heart failure on hip fracture outcomes: a population-based study. J Hosp Med. 2011;6(9):507-12.
57. Smeets SJM, van Wunnik BPW, Poeze M, Slooter GD, Verbruggen JPAM. Cardiac overscreening hip fracture patients. Arch Orthop Trauma Surg. 2020;140(1):33-41.
58. Klestil T, Röder C, Stotter C, Winkler B, Nehrer S, Lutz M, Klerings I, et al. Immediate versus delayed surgery for hip fractures in the elderly patients: a protocol for a systematic review and meta-analysis. Syst Rev. 2017;6(1):164.
59. Karakus O, Ozdemir G, Karaca S, Cetin M, Saygi B. The relationship between the type of unstable intertrochanteric femur fracture and mobility in the elderly. J Orthop Surg Res. 2018;13(1):207.

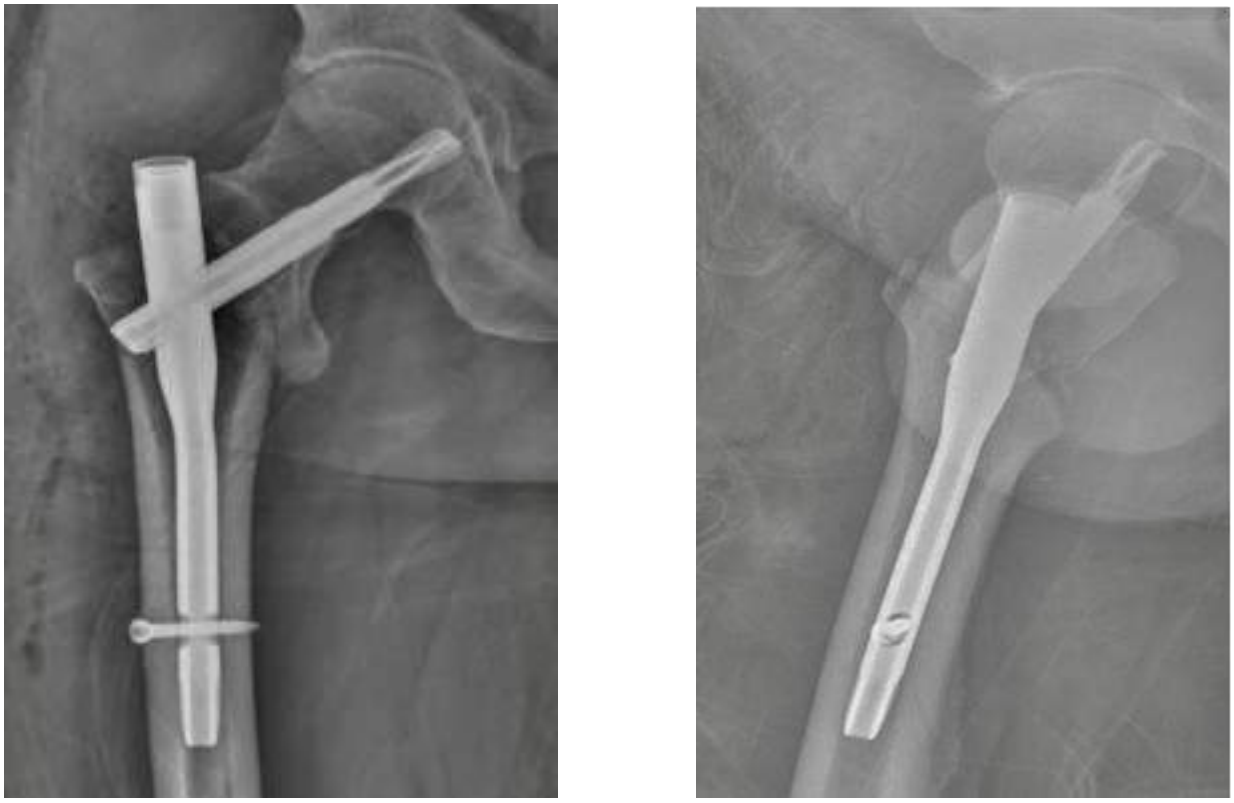
60. Carpintero P, Caeiro JR, Carpintero R, Morales A, Silva S, Mesa M. Complications of hip fractures: A review. World J Orthop. 2014;5(4):402-11.
61. Monk TG, Price CC. Postoperative cognitive disorders. Curr Opin Crit Care. 2011;17(4):376-81.
62. Dolan MM, Hawkes WG, Zimmerman SI, Morrison RS, Gruber-Baldini AL, Hebel JR, et al. Delirium on hospital admission in aged hip fracture patients: prediction of mortality and 2-year functional outcomes. J Gerontol A Biol Sci Med Sci. 2000;55(9):M527-34.
63. Fleisher LA, Beckman JA, Brown KA, Calkins H, Chaikof EL, Fleischmann KE, et al. ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery: Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery) Developed in Collaboration With the American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, and Society for Vascular Surgery. J Am Coll Cardiol. 2007;50(17):1707-32.
64. Huddleston JM, Gullerud RE, Smither F, Huddleston PM, Larson DR, Phy MP, et al. Myocardial infarction after hip fracture repair: a population-based study. J Am Geriatr Soc. 2012;60(11):2020-6.
65. Bateman L, Vuppala S, Porada P, Carter W, Baijnath C, Burman K, et al. Medical management in the acute hip fracture patient: a comprehensive review for the internist. Ochsner J. 2012 Summer;12(2):101-10.
66. Chong CP, Savige JA, Lim WK. Medical problems in hip fracture patients. Arch Orthop Trauma Surg. 2010;130(11):1355-61.

67. Schneider MA. Prevention of catheter-associated urinary tract infections in patients with hip fractures through education of nurses to specific catheter protocols. Orthop Nurs. 2012;31(1):12-8.
68. Johansson I, Athlin E, Frykholm L, Bolinder H, Larsson G. Intermittent versus indwelling catheters for older patients with hip fractures. J Clin Nurs. 2002;11(5):651-6.
69. Dovjak P, Iglseder B, Mikosch P, Gosch M, Müller E, Pinter G, et al. Treatment and prevention of postoperative complications in hip fracture patients: infections and delirium. Wien Med Wochenschr. 2013;163(19-20):448-54.
70. Ulucay C, Eren Z, Kaspar EC, Ozler T, Yuksel K, Kantarci G, et al. Risk factors for acute kidney injury after hip fracture surgery in the elderly individuals. Geriatr Orthop Surg Rehabil. 2012;3(4):150-6.
71. Vishwanathan K, Akbari K, Patel AJ. Is the modified Harris hip score valid and responsive instrument for outcome assessment in the Indian population with pertrochanteric fractures?. Journal of orthopaedics. 2018;15:40-6.
72. Munde SL, Gautam V, Gulia AK, Kumar S, Sharma D, Arya AK. Functional Evaluation of Cemented Bipolar Hemiarthroplasty in unstable intertrochanteric fracture femur: A Prospective Study. International Journal of Orthopaedics Traumatology & Surgical Sciences. 2019;5:94-9.
73. Koh LK, Saw SM, Lee JJ, Leong KH, Lee J; National Working Committee on Osteoporosis. Hip fracture incidence rates in Singapore 1991-1998. Osteoporos Int. 2001;12:311-8.
74. Zhang YW, Lu PP, Li YJ, Dai GC, Chen MH, Zhao YK, et al. Prevalence, Characteristics, and Associated Risk Factors of the Elderly with Hip Fractures: A Cross-Sectional Analysis of NHANES 2005-2010. Clin Interv Aging. 2021;16:177-185.

75. Khazai NB, Beck GR Jr, Umpierrez GE. Diabetes and fractures: an overshadowed association. Curr Opin Endocrinol Diabetes Obes. 2009;16:435-45.
76. Quidwai SA, Singh R, Mishra AN, Trivedi V, Khan AA, Kushwaha SS, et al. Comparative study of functional outcome of the intertrochanteric fracture of femur managed by Dynamic hip screw and proximal femoral nail. National journal of clinical orthopaedics. 2019;3:26-30.
77. Yadav S, Srivastava DC, Shukla M. Comparative evaluation of dynamic hip screw and proximal femoral nail for fracture of intertrochanteric femur. Int J Res Orthop. 2016;2:286-90.
78. Simunovic N, Devereaux PJ, Sprague S, Guyatt GH, Schemitsch E, DeBeer J, et al. Effect of early surgery after hip fracture on mortality and complications: systematic review and meta-analysis. Cmaj. 2010;182:1609-16.

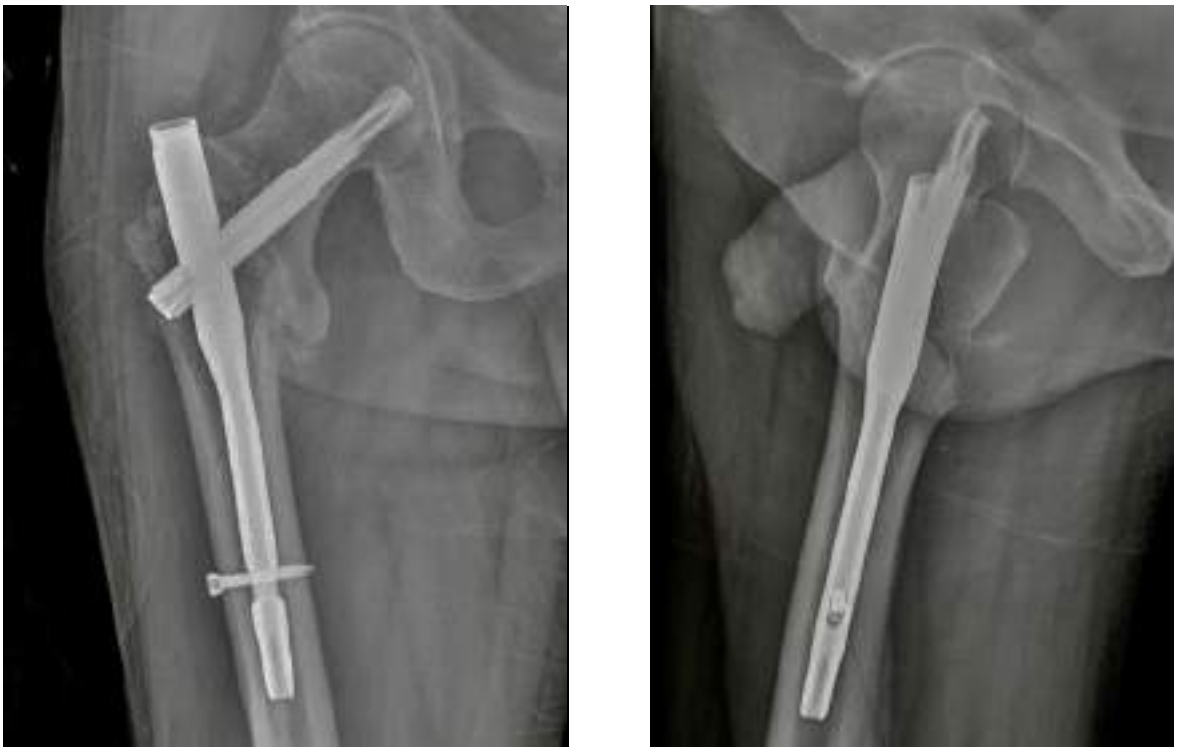
CASE 1

PICTURE 7: CASE 1 - PREOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW



PICTURE 8: CASE 1 - POSTOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW

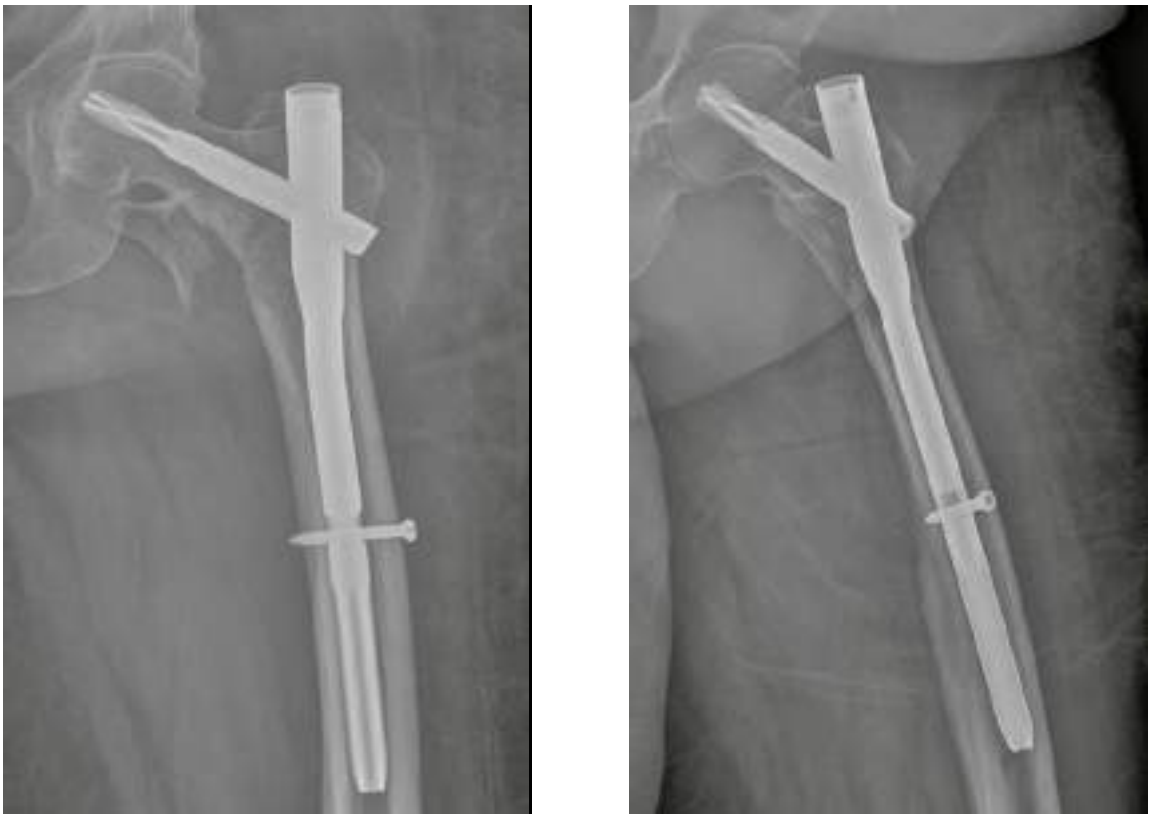
PICTURE 9: CASE 1 - FOLLOW UP XRAYS AFTER 4 WEEKS
ANTEROPOSTERIOR AND LATERAL VIEW



PICTURE 10: CASE 1 - FOLLOW UP XRAYS AFTER 4 MONTHS
ANTEROPOSTERIOR AND LATERAL VIEW

CASE 2

PICTURE 11: CASE 2 - PREOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW



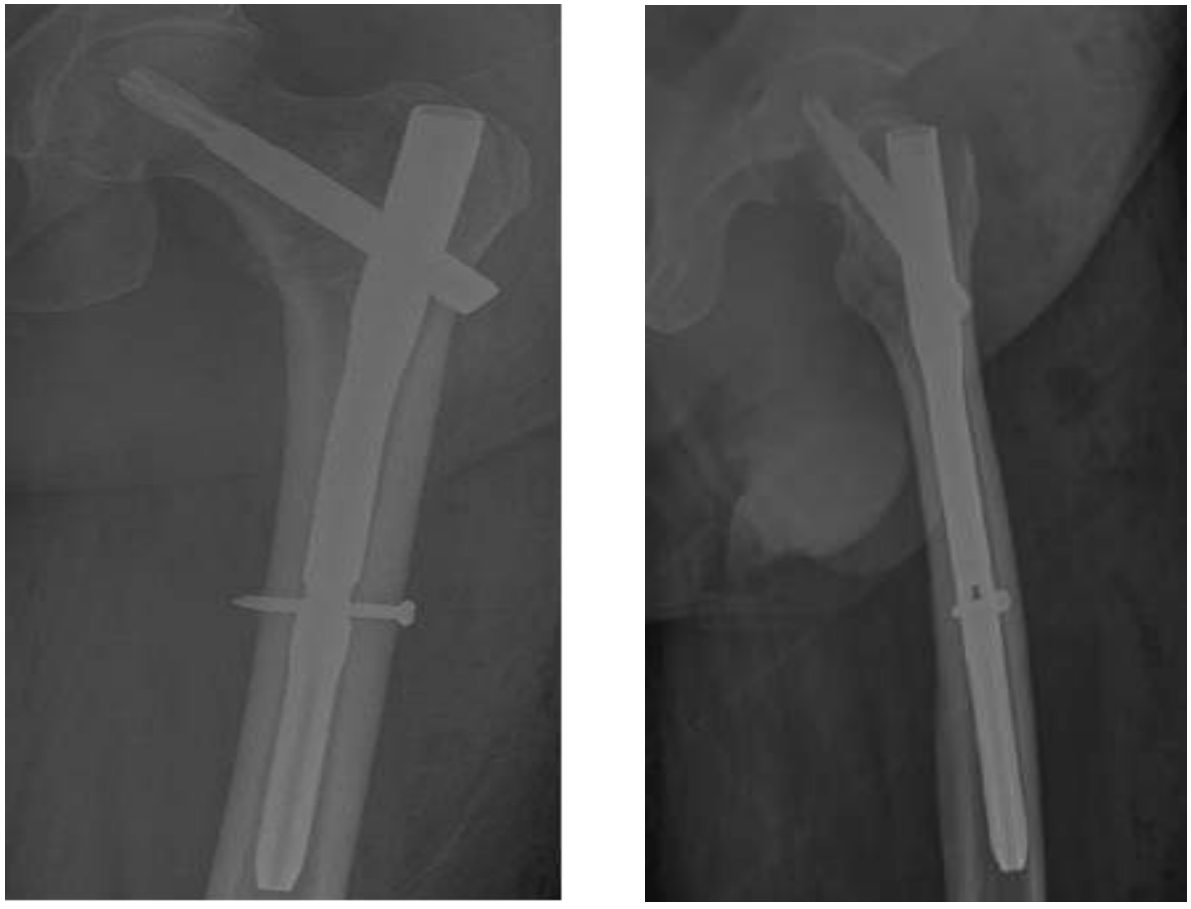
PICTURE 12: CASE 2 - POSTOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW

PICTURE 13: CASE 2 - FOLLOW UP XRAYS AFTER 4 WEEKS
ANTEROPOSTERIOR AND LATERAL VIEW

PICTURE 14: CASE 2 - FOLLOW UP XRAYS AFTER 4 MONTHS
ANTEROPOSTERIOR AND LATERAL VIEW

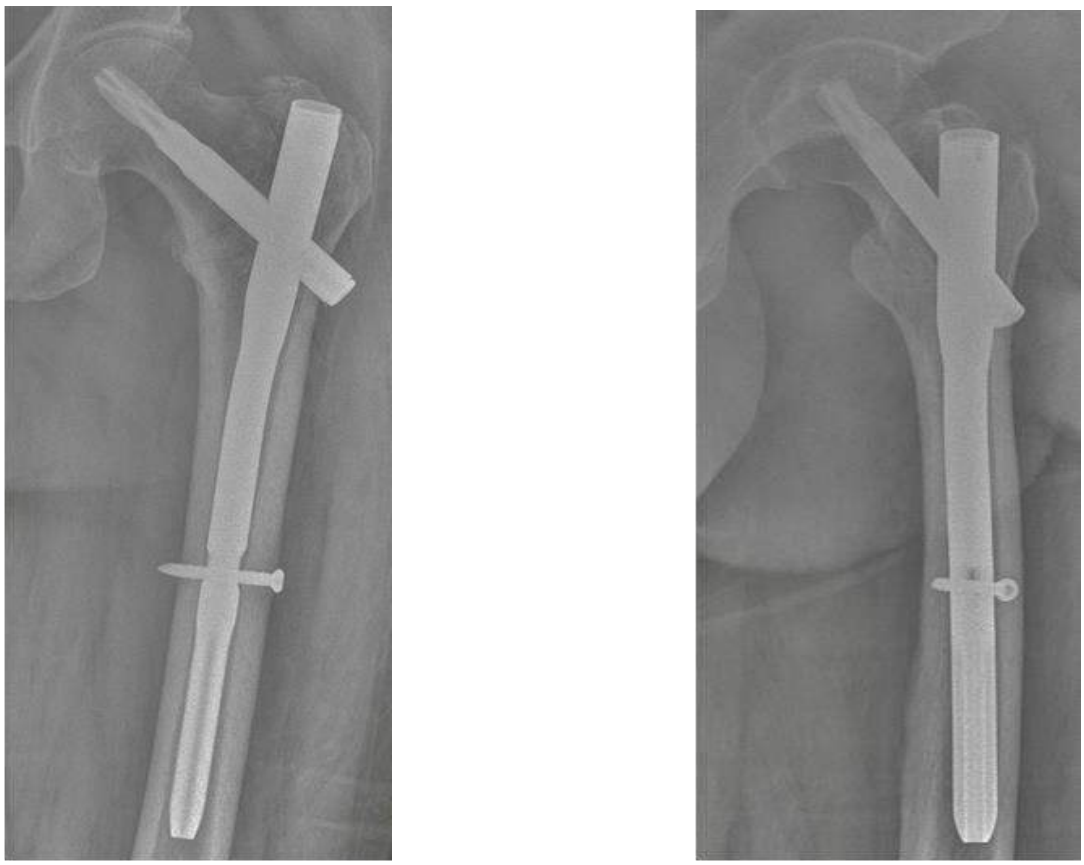
CASE 3

PICTURE 15: CASE 3 - PREOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW



PICTURE 16 :CASE 3 - POSTOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW

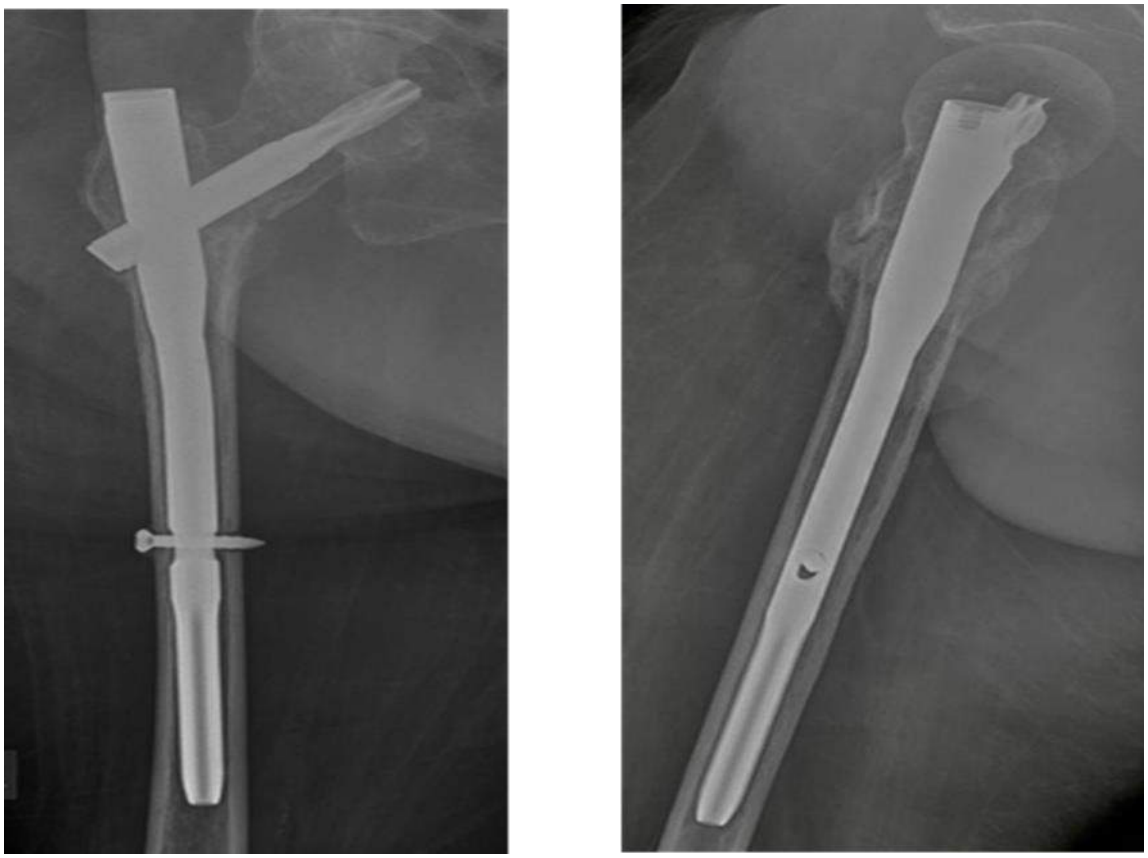
PICTURE 17: CASE 3 - FOLLOW UP XRAYS AFTER 4 WEEKS
ANTEROPOSTERIOR AND LATERAL VIEW



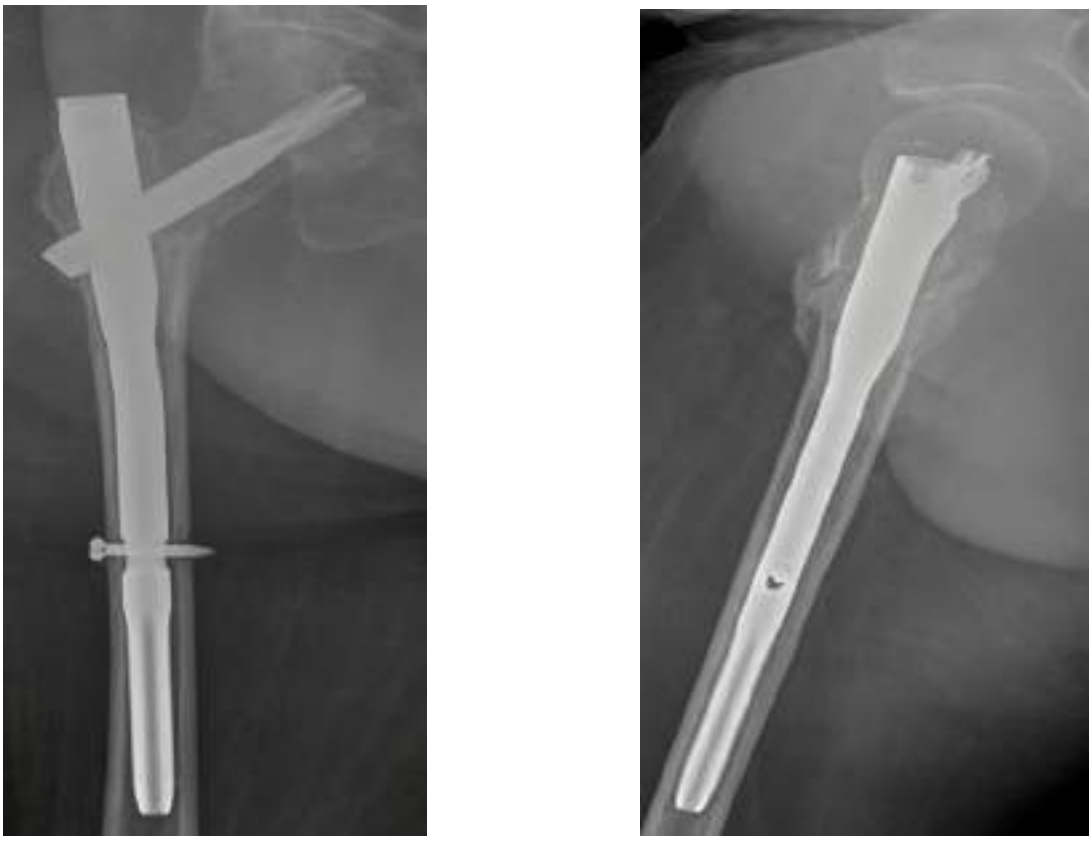
PICTURE 18: CASE 3 - FOLLOW UP XRAYS AFTER 4 MONTHS
ANTEROPOSTERIOR AND LATERAL VIEW

CASE 4

PICTURE 19: CASE 4 - PREOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW



PICTURE 20 :CASE 4 - POSTOP XRAYS ANTEROPOSTERIOR AND LATERAL VIEW



PICTURE 21: CASE 4 - FOLLOW UP XRAYS AFTER 4 WEEKS
ANTEROPOSTERIOR AND LATERAL VIEW

PICTURE 22: CASE 4 - FOLLOW UP XRAYS AFTER 4 MONTHS
ANTEROPOSTERIOR AND LATERAL VIEW

KEY TO MASTER CHART

AKI	Acute Kidney Injury
AR	Aortic Regurgitation
CABG	Coronary Artery Bypass Surgery
CKD	Chronic Kidney Disease
DM	Diabetes Mellitus
EF	Ejection Fraction
F	Female
GI	Gastro Intestine
HTN	Hypertension
LV	Left Ventricular
M	Male
MI	Myocardial Infarction
MR	Mitral Regurgitation
RSA	Road Side Accident
TB	Tubelculosis
UTI	Urinary Tract Infection

S NO	MRD NO.	NAME	AGE	SEX	MODE OF INJURY	Diabetes Mellitus	Hypertension	Others (CKD, stroke, seizures)	IHD	ANTIPLATELET AGENTS TAKEN OR NOT	DATE OF ADMISSION	DATE OF DISCHARGE	HOSPITAL STAY	TIME PERIOD DELAY IN OPERATION	CAUSE OF DELAY IN OPERATION	BOYD AND GRIFFIN CLASSIFICATION	ECHO FINDING (EF)
1	957233	CD	82	F	TRIVIAL TRAUMA	-	HTN	-	POST ANGIOPLASTY	YES	20/8/2020	22/8/2020	NOT PROLONGED	NOT DELAYED	-	II	60% EF, Aortic calcification, annular calcification
2	934671	SD	79	F	TRIVIAL TRAUMA	DM II	HTN	CKD	LV DYSFUNCTION	YES	14/6/2020	21/6/2020	PROLONGED	> 3 DAYS	ACUTE KIDNEY INJURY	III	28% EF, moderate LV global hypokinesia
3	867229	VG	62	F	TRIVIAL TRAUMA	-	-	-	LV DYSFUNCTION	YES	15/12/2019	23/12/2019	NOT PROLONGED	NOT DELAYED	-	III	48% EF, post prosthetic mitral valve
4	871797	SC	74	M	TRIVIAL TRAUMA	-	HTN	-	LV DYSFUNCTION	YES	24/12/2019	5/1/2020	PROLONGED	>3 DAYS	HYPOTENSION	II	29%EF
5	348042	JS	74	M	TRIVIAL TRAUMA	DM II	HTN	-	LV DYSFUNCTION	YES	17/11/2019	26/11/2019	PROLONGED	<3 DAYS	TAKEN CLOPIDOGREL	III	48% EF,
6	754974	GK	76	F	TRIVIAL TRAUMA	DM II	-	Stroke	POST CABG	YES	8/10/2019	19/10/2019	PROLONGED	<3 DAYS	TAKEN CLOPIDOGREL	III	46% EF, dystolic dysfunction
7	817714	GS	40	M	FALL FROM HEIGHT	-	-	-	LV DYSFUNCTION	YES	28/10/2019	2/11/2019	NOT PROLONGED	NOT DELAYED	-	III	51% EF, global hypokinesia
8	851814	VC	69	F	TRIVIAL TRAUMA	-	HTN	CKD	LV DYSFUNCTION	YES	18/11/2019	18/12/2019	PROLONGED	<3 DAYS	ACUTE KIDNEY INJURY	II	45% EF, Moderate MR,AR
9	88307	RK	68	F	TRIVIAL TRAUMA	DM II	-	-	LV DYSFUNCTION	YES	28/1/2019	5/2/2019	PROLONGED	<3 DAYS	UNCONTROLLED DIABETES	II	48%, global hypokinesia
10	175095	JS	83	M	TRIVIAL TRAUMA	DM II	HTN	CKD	OLD MI	YES	30/12/2019	12/1/2019	PROLONGED	>3 DAYS	HYPERTENSION	II	28%, global hypokinesia
11	891237	GK	87	F	TRIVIAL TRAUMA	DM II	HTN	-	POST ANGIOPLASTY	YES	2/2/2020	10/2/2020	PROLONGED	>3 DAYS	TAKEN CLOPIDOGREL	III	25% LVEF, sclerotic aortic valve
12	779233	CR	58	F	TRIVIAL TRAUMA	-	-	-	LV DYSFUNCTION	YES	16/3/2019	21/3/2019	NOT PROLONGED	NOT DELAYED	-	II	51% LVEF, Moderate MR
13	924792	SJ	71	F	TRIVIAL TRAUMA	_	-	SEZIURES	LV DYSFUNCTION	YES	2/5/2019	11/5/2019	PROLONGED	<3 DAYS	TAKEN CLOPIDOGREL	III	48% LVEF, RWMA
14	930159	PS	74	M	TRIVIAL TRAUMA	DM II	HTN	CKD	POST ANGIOPLASTY	YES	29/5/2020	8/6/2020	PROLONGED	>3 DAYS	TAKEN CLOPIDOGREL	III	25% LVEF, moderate Aortic stenosis
15	44196	GK	57	F	TRIVIAL TRAUMA	-	-	-	LV DYSFUNCTION	YES	1/8/2020	11/8/2020	PROLONGED	>3 DAYS	TAKEN CLOPIDOGREL	II	48% EF, Mild MR
16	952733	LS	68	M	RSA	-	-	-	LV DYSFUNCTION	YES	9/8/2020	14/8/2020	NOT PROLONGED	NOT DELAYED	-	III	53% EF Mild MR
17	858931	CD	75	F	TRIVIAL TRAUMA	DM II	HTN	CKD	OLD MI	YES	29/11/2020	8/12/2019	PROLONGED	>3 DAYS	TAKEN CLOPIDOGREL	III	28% EF, Mild MR
18	923815	HK	75	F	TRIVIAL TRAUMA	DMII	HTN	-	LV DYSFUNCTION	YES	26/4/2020	4/5/2020	PROLONGED	<3 DAYS	HYPONATREMIA	III	48% EF, Mild MR
19	925349	DD	75	F	TRIVIAL TRAUMA	DM II	HTN	-	OLD MI	YES	6/5/2020	13/5/2020	PROLONGED	>3 DAYS	TAKEN CLOPIDOGREL	III	42% EF, Mild MR

S NO	MRD NO.	LOCAL EXAMINATION				Limb shortening	COMPLICATIONS			HARRIS HIP SCORING SYSTEM			
		Movements at hip joint	Attitude of the limb	Swelling around proximal thigh	Skin changes		Perioperative	immediate post op	Late Post op	AT 4-6 WEEKS		AT 3-4 MONTHS	
1	957233	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	—	—	—	48	POOR	71	FAIR
2	934671	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	HYPOTENSION	AKI	—	45	POOR	60	POOR
3	867229	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	—	—	—	58	POOR	79	FAIR
4	871797	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	HYPOTENSION	AKI ,COGNITIVE ALTERATIONS	-	23	POOR	46	POOR
5	348042	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	DIFFICULTY IN REDUCTION	-	WOUND INFECTION	38	POOR	56	POOR
6	754974	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	_	-	-	50	POOR	71	FAIR
7	817714	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	-	-	-	69	POOR	84	GOOD
8	851814	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	ANAEMIA	-	-	41	POOR	73	FAIR
9	88307	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	HYPOTENSION	-	-	48	POOR	71	FAIR
10	175095	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	HYPOTENSION	CARDIOVASCULAR COMPROMISE (MI, ACS)	BED SORE	22	POOR	45	POOR
11	891237	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	HYPOTENSION	UTI	-	38	POOR	52	POOR
12	779233	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	-	-	-	67	POOR	82	GOOD
13	924792	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	-	-	-	40	POOR	71	FAIR
14	930159	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	CARDIAC COMPLICATION	CARDIOVASCULAR COMPROMISE (MI, ACS)	WOUND INFECTION , BED SORE	30	POOR	55	POOR
15	44196	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	-	-	-	48	POOR	81	GOOD
16	952733	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	-	-	-	54	POOR	84	GOOD
17	858931	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	ANAEMIA	AKI , ARRYTHIMIAS	UTI	31	POOR	56	POOR
18	923815	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	HYPONATREMIA	COGNITIVE ALTERATION	BED SORE	45	POOR	60	POOR
19	925349	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	ANAEMIA	UTI	-	40	POOR	66	POOR

S NO	MRD NO.	NAME	AGE	SEX	MODE OF INJURY	Diabetes Mellitus	Hypertension	Others (CKD, stroke, seizures)	IHD	ANTIPLATELET AGENTS TAKEN OR NOT	DATE OF ADMISSION	DATE OF DISCHARGE	HOSPITAL STAY	TIME PERIOD DELAY IN OPERATION	CAUSE OF DELAY IN OPERATION	BOYD AND GRIFFIN CLASSIFICATION	ECHO FINDING (EF)
20	923998	BL	70	M	TRIVIAL TRAUMA	-	-	-	POST ANGIOPLASTY	NO	27/4/2020	1/5/2020	NOT PROLONGED	<3 DAYS	TAKEN CLOPIDOGREL	III	EF-45%
21	794022	GK	70	F	TRIVIAL TRAUMA	DM II	-	CKD	LV DYSFUNCTION	YES	18/11/2019	23/11/2019	NOT PROLONGED	NOT DELAYED	-	II	EF-42%
22	925707	PD	65	M	TRIVIAL TRAUMA	-	-	PULMONARY TB	LV DYSFUNCTION	NO	8/5/2020	13/5/2020	NOT PROLONGED	NOT DELAYED	-	III	EF-31%
23	633321	SS	69	M	TRIVIAL TRAUMA	-	-	-	LV DYSFUNCTION	YES	26/9/2020	1/10/2020	NOT PROLONGED	NOT DELAYED	-	III	EF-38%
24	594741	UD	81	F	TRIVIAL TRAUMA	DM II	HTN	-	LV DYSFUNCTION	YES	9/11/2020	18/11/2020	PROLONGED	>3 DAYS	DESATURATION	II	EF-28% with mild MR
25	1003020	RK	80	F	TRIVIAL TRAUMA	DM II	HTN	-	LV DYSFUNCTION	YES	21/12/2020	2/1/2021	PROLONGED	>3 DAYS	ACUTE KIDNEY INJURY	III	EF-48%
26	1005243	SK	71	M	TRIVIAL TRAUMA	-	-	-	POST ANGIOPLASTY	YES	28/12/2020	6/1/2021	PROLONGED	<3 DAYS	TAKEN CLOPIDOGREL	IV	EF-38% with mild MR and AR
27	1013515	BB	85	F	TRIVIAL TRAUMA	-	-	-	LV DYSFUNCTION	YES	16/1/2021	26/1/2021	PROLONGED	>3 DAYS	TAKEN CLOPIDOGREL	III	EF-28% with moderate MR
28	1022783	NK	55	F	TRIVIAL TRAUMA	-	-	-	POST CABG / POST AORTIC VALVE REPLACEMENT	YES	2/2/21	9/2/21	PROLONGED	<3 DAYS	TAKEN CLOPIDOGREL	II	NORMAL LVEF
29	1045349	HS	80	M	TRIVIAL TRAUMA	DM II	-	CKD	POST CABG	YES	8/3/2021	18/3/2021	PROLONGED	>3 DAYS	HYPERKALEMIA	III	LVEF-38%
30	264832	MK	74	F	TRIVIAL TRAUMA	-	-	-	LV DYSFUNCTION	YES	17/3/2021	22/3/2021	NOT PROLONGED	NOT DELAYED	-	III	LVEF-42%
31	601499	IK	72	F	TRIVIAL TRAUMA	DM II	-	-	LV DYSFUNCTION	NO	13/4/2021	20/4/2021	PROLONGED	<3 DAYS	UNCONTROLLED DIABETES	III	LVEF-32%
32	1125815	KK	65	F	TRIVIAL TRAUMA	-	-	-	LV DYSFUNCTION	NO	22/6/2021	25/6/2021	NOT PROLONGED	NOT DELAYED	-	II	LVEF 42 %

S NO	MRD NO.	LOCAL EXAMINATION				Limb shortening	COMPLICATIONS			HARRIS HIP SCORING SYSTEM			
		Movements at hip joint	Attitude of the limb	Swelling around proximal thigh	Skin changes		Perioperative	immediate post op	Late Post op	AT 4-6 WEEKS		AT 3-4 MONTHS	
20	923998	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	HYPOTENSION	UTI	-	58	POOR	74	FAIR
21	794022	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	-	-	-	52	POOR	71	FAIR
22	925707	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	-	-	-	44	POOR	76	FAIR
23	633321	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	-	-	-	38	POOR	56	POOR
24	594741	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	-	GI BLEEDING	ANAEMIA	15	POOR	30	POOR
25	1003020	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	-	ARRYTHIMIAS	-	31	POOR	58	POOR
26	1005243	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	HYPOTENSION	-	-	30	POOR	56	POOR
27	1013515	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	HYPOTENSION	COGNITIVE ALTERATION	-	20	POOR	45	POOR
28	1022783	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	-	-	-	42	POOR	75	FAIR
29	1045349	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	CARDIAC COMPLICATION	-	HYPOTENSION	31	POOR	58	POOR
30	264832	PAINFULL	EXTERNALLY ROTATED	YES	NO	YES	-	-	-	48	POOR	81	GOOD
31	601499	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	-	ARRYTHIMIAS	-	30	POOR	55	POOR
32	1125815	PAINFULL	EXTERNALLY ROTATED	YES	YES	YES	-	-	-	44	POOR	71	FAIR

Baba Farid University
of Health Sciences
Sadiq Road
Faridkot-151 203 (Pb). INDIA.
Phone : 01639-256232,256236
Tele/Fax : 01639-256235
Email – Examination@bfuhs.ac.in

No. BFUHS/2K21p-TH/ 5060

Date 20/1/2021

The Principal,
DMC,Ludhiana

Subject: **Approval of Plan of Thesis.**

This is to inform you that the Faculty of Medical Sciences in its meeting held on 22.01.2021 has approved the plan of thesis of **Dr. Khushwinder Singh**, a student of your college for **MS Orthopaedics** along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
Outcome in patients with proximal femur fracture with cardiac conditions

Supervisor
Dr. Pankaj Mahindra
Assoc. Prof.,
Dept. of Orthopaedics,
DMCH, Ludhiana.

Co-Supervisor
Dr. Gurpreet S Wander
Prof. & Head,
Dept. of Cardiology,
DMCH, Ludhiana.

Dr. Rajnish Garg
Prof. & Head,
Dept. of Orthopaedics,

The student has to submit the three copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

S P Singh
Dr. S P Singh MS(Oph)
Controller of Examinations

Note :

1. ***If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, inform undersigned within one month after issue of this letter.***
2. *The student may submit the thesis as per the schedule already conveyed i.e for May/June examination 30th Nov of the preceding the year of examination and for Nov/Dec examinations 31st May of the year of examination.*

OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MASTER OF SURGERY

IN

ORTHOPAEDICS

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

NOVEMBER 2019

DR. KHUSHWINDER SINGH

DEPARTMENT OF ORTHOPAEDICS
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS
For the degree of	M.S. Orthopaedics
Name of the candidate	Dr. Khushwinder Singh
Supervisor	Dr. Pankaj Mahindra, Associate Professor, Department of Orthopaedics, DMC&H Ludhiana
Co-supervisor	Dr Gurpreet S Wander, Professor & Head, Department of Cardiology, DMC&H Ludhiana Dr. Rajnish Garg, Professor & Head, Department of Orthopaedics, DMC&H Ludhiana
Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Proximal femur fracture are associated with multiple comorbidities including cardiovascular disease and osteoporosis. Recent surgical and medical advances have made it possible for better outcomes in patients with such fractures . The purpose of this study to evaluate functional and radiological outcomes in patients with proximal femur fracture with cardiac conditions.

Aim of Study:

- To assess the outcome of fracture in patients with cardiac conditions.
- To evaluate delay in surgery due to cardiac medication or any other cause.
- To study quality of life post hospital discharge.

Materials & methods: Study will be conducted on inpatients in department of orthopaedics in teaching hospital attached to Dayanand medical college and hospital Ludhiana who have given valid informed consent to take part in the study. A structured pre designed proforma will be used for this study.

Clinical Significance: Post-operative cases of proximal femur fracture in cardiac patients are associated with prolonged hospital stay and various early and delayed complications such as infection, haemorrhage, iatrogenic nerve injuries, deep vein thrombosis, heterotrophic ossification.

Keywords: Proximal femur fracture, cardiac conditions.

(Signature)	(Signature)	(Signature)	(Signature)	(Signature)
Candidate	Co-supervisor	Co-supervisor	Supervisor	Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS"** exist in the Department of Orthopaedics, DMC&H, Ludhiana and will be provided to be candidate. We will see that the data being included in the thesis are genuine and is collected by the candidate himself under our supervision and guidance.

Supervisor

Dr. Pankaj Mahindra
Associate Professor
Department of Orthopaedics
DMCH, Ludhiana

Co-Supervisor(s)

Dr. G.S Wander
Professor & Head
Department of Cardiology
DMCH, Ludhiana

Dr. Rajnish Garg
Professor & Head
Department of Orthopaedics
DMCH, Ludhiana

HEAD OF DEPARTMENT

Dr. Rajnish Garg
Professor and Head
Department of Orthopaedics
DMCH, Ludhiana

Place: _____

Date: _____

APPROVAL PROFORMA
BY
RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	DR. KHUSHWINDER SINGH
Department	ORTHOPAEDICS
Topic of Thesis	OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS
Likely date of appearing in PG examination	MAY 2022
Date of enrolment	MAY 18, 2019
Name of Head of Department	DR. RAJNISH GARG
1) Supervisor **2) Co-Supervisor**	1) DR PANJKAJ MAHINDRA 2) DR GS WANDER 3) DR RAJNISH GARG
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
Dr. Jaspal Singh (Professor & Head, Surgery)	Mr. A K Jindal (Member, Ethics Committee)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
Dr. Sandeep Kaushal (Assistant Dean Academics)	Dr. Deepinder K Chhina (Professor & Head, Microbiology)
Dr. Rajoo Singh Chhina (Dean Academics)	Dr. Neena Sood (Professor & Head, Pathology)
Dr. Gurpreet S Wander (Vice Principal)	Dr. Gurpreet S Wander (Vice Principal)
	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved: Yes / ~~No~~

Dr. Sandeep Puri
Chairperson
Research Committee

Chairperson
Research Committee

Approved: Yes / ~~No~~

Prof. Arvind Malhotra
Chairperson
Ethics Committee

Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	DR KHUSHWINDER SINGH WARD NO 2 , STREET NO 2 GURU ARJUN DEV NAGAR MANSA , PUNJAB
2	NAME OF THE INSTITUTE	DAYANAND MEDICAL COLLEGE AND HOSPITAL , LUDHIANA
3	COURSE OF STUDY AND SUBJECT	MASTER OF SURGERY ORTHOPAEDICS
4	DATE OF ADMISSION OF COURSE	18/05/2019
5	TITLE OF THE TOPIC	OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Proximal femur fracture occurring in the region from extra-capsular basilar neck region to the region along the lesser trochantric proximal to development of medullary canal. They are classified on the basis of anatomical position - neck of femur, inter-trochantric, sub-trochantric.

Proximal femur fractures correspond to a large percentage of hospitalisations and are associated with high morbidity and mortality rates. It is one of the more serious health problems that affects the elderly.[1] India being a large demographic country has large percentage of geriatric population. This population often has comorbidities that not only prolong recovery after surgery, but also increase the risk of post-operative morbidity and mortality.[2] It is estimated that the number of cases can reach up to 6.26 million by 2050, mostly because of the population pyramid inversion worldwide. Proximal femur fractures are associated with trivial trauma in geriatric population and high energy trauma in young population. In elderly proximal femur fracture is a consequence of conditions such as malnutrition, decreased visual acuity and reflexes, chronic use of medications, and, most importantly, the progressive decrease in bone mineral density and deterioration of bone micro-architecture that leads to increased fragility and to increased risk of fracture.[3]

Proximal femur fracture has been associated with multiple comorbidities including cardiac conditions among older adults. Syncopal episode after cardio-vascular event increases risk of osteoporotic proximal femur fractures. Patients with cardiac conditions prefer sedentary life style, which increases osteopenia and bone-loss and increasing chances of proximal femur fracture. The reported 30-day mortality rate after proximal femur fracture in the elderly is approximately 9.6% and increases to approximately 30% at one year. However the exact rate varies and may depend on fracture pattern, prior functional status, and baseline health prior to injury.[4-6]

CAD and osteoporosis have some common risk factors as hypoestrogenemia, hypoparathyroidism, hypohomocysteinemia,

vitamins D and K deficiency. Similar molecular pathways involved in bone and vascular mineralization, and calcification mechanisms that seem to be similar in vascular structure and bone.

Medications including cholesterol-lowering stains and bisphosphonates have been shown to affect both atherosclerosis and osteoporotic fractures. Both decreasing the incidence of CAD and proximal femur fractures. Hyper-cholesterolaemia is a major risk factor for atherosclerotic heart disease, Statins electively lower plasma cholesterol and reduce coronary artery disease morbidity and mortality. The statins inhibit HMG-CoA reductase, the rate-determining step of cholesterol biosynthesis and have been shown to decrease vascular calcification in relation to the magnitude of their LDL reduction. Statins as bone anabolic agents increase the bone mass by enhancing bone morphogenetic protein-2 (BMP-2)-mediated osteoblast expression.

Bisphosphonates (BPs) are a group of anti-resorptive medications that preserve the macro- and micro-architecture of the skeleton and reduce the risk of fracture and inhibit vascular calcification and atherosclerosis.

There is also a similar genetic predisposition for both vascular and bone health. Genetic evidence has also been reported that calcified atherosclerotic plaques consist of same bone matrix proteins such as Gla protein, bone morphogenetic protein-2, osteopontin, osteocalcin, and collagen. Although in this genetic explanation specific attention has been devoted to hypertension, which is believed to predispose individuals not only to heart disease and stroke but also to bone mineral loss.

6.2 REVIEW OF LITERATURE

Baransel Saygı, Korhan Ozkan established that in patients with inter-trochantric fracture associated with comorbidities, it was a practice to manage these patients on traction and delaying surgery. Since traction is believed to reduce pain, skin traction is used in many hip fracture patients. Pain reduction during the preoperative preparatory period is important in hip fracture patients.[7]

Hip fracture, as a serious consequence of osteoporosis, has been associated with multiple comorbidities including cardiovascular disease (CVD) among older adults. Researchers have suggested common etiologic mechanisms for CVD and hip fracture, two independent age-related disorders previously considered.[8]

Bone mineralization and vascular calcification shared common pathologic path- ways and medications, including cholesterol-lowering stains and bisphosphonates which have been shown to affect both atherosclerosis and osteoporotic fractures.[9]

In this issue of Age and Ageing, Ausset and co-workers present interesting observational data on the prognostic value of cardiac troponin release after proximal hip fracture fracture.[10] They measured troponin I on days 1–3 post-operatively in 75 patients, and showed that a troponin rise was predictive not only of in-hospital cardiac events but also of cardiac events and total mortality at 6 months. Twenty-seven per cent of their patients had a raised troponin I.

Study established by Chong and co-workers in the March study in the March 2009 found an even higher rate of raised troponin I in a series of emergency orthopaedic patients aged over 60, of whom about two-thirds had a fractured Proximal femur fracture.[11] Over half of their patients had an abnormal troponin result post-operatively, and multivariate analysis showed that this was strongly predictive of 1 year mortality. Ten of the 53 patients with a raised troponin I had a diagnosis of a myocardial infarction (MI), with 7 of these being dead at 1 year. It is likely that the majority of cases of troponin rise in these studies were due to non- ischaemic causes, the troponin being released due to physiological stress on a background of frailty.

However, a significant number clearly did suffered MI. These findings raise possibilities for intervention to improve outcomes. For example, using aspirin or beta blockers either peri-operatively or long term seems an attractive proposition, given their established roles in cardiovascular prevention. However, we should be cautious before jumping on the obvious therapeutic bandwagons, since the balance between benefits and risks cannot be easily extrapolated from trials in other contexts to this complex patient group 14.

ACC/AHA guideline indicates screening patients with a high chance of pathology is more logical than screening all proximal femur fracture patients, therefore in the low risk group transthoracic echocardiography (TTE) screening probably not useful. It has been suggested to routinely perform an echocardiography in elderly patients with proximal femur fractures.[12] Some authors have reported a benefit of routine echocardiography on mortality after hip fracture surgery [13], where others have not [12-15] Screening all hip fracture patients with transthoracic echocardiography (TTE) identified in 8% of patients significant aortic stenosis. Conversely severe aortic stenosis is no contraindication for surgery and does not influence early mortality.[16,17] Another study found that preoperative TTE leads to an increased delay to surgery. Delay to surgery is associated with worse outcome after hip fracture surgery. Furthermore, TTE screening has cost implications, as this needs to be a continuously available service. One retrospective matched control study showed lower postoperative and 1-year mortality rates after focused TTE screening in a hip fracture population.[12]

Paul j evans and brain exhibited that the incidence of proximal femoral fractures among females is 2 to 3 times higher than the incidence of such fractures among males.[18] Also, the risk of sustaining a proximal femoral fracture doubles every 10 years after age 50 years.[18] Other risk factors for proximal femoral fractures include osteoporosis,[18] a maternal history of hip fractures, excessive alcohol consumption, high caffeine intake, physical inactivity, low body weight, previous hip fracture, the use of certain psychotropic medications, visual impairment, dementia, residence in an institution and smoking.

As per study by B Komarswamy et al [19] in 2007, conducted on 2270 patients between January 2003 and October 2005 admitted with a proximal femoral fracture, 11 patients were found to have recent myocardial infarction. Of these 11 patients, 8 were females. The average age was 78.2 years. Average delay from time of infarction to operation was 11.2 days. Mortality at 1 and 6 months was 45.4% and 63.5 % respectively.

A study by Gerber et al [20] observed the association between myocardial infarction (MI) and fracture and evaluated whether MI constitutes a risk factor for osteoporotic fracture and examined secular trends in this association. The study was conducted on community control subjects individually matched (1:1) to cases on age, sex, and year of onset (n=6642) who were followed up through 2009. Outcome measures were time to osteoporotic fracture, overall and by anatomic site, and death. Fracture incidence rates were stable in controls but increased markedly over time among MI cases. Accordingly, although an overall excess of fracture risk after MI was observed (adjusted hazard ratio, 1.32; 95% confidence interval, 1.12 to 1.56). Trends were similar regardless of age, sex or fracture site. Conversely, the overall hazard ratio for death in MI cases versus controls did not change materially despite a continuous decline in 30-day case fatality rate (12.5% in 1979 to 1989; 6.7% in 2000 to 2006). Observed changes in the baseline prevalence of cardiovascular risk factors, MI characteristics, and comorbidities did not fully account for the trends in fracture risk. The trend is consistent with the displacement of post-MI outcomes toward noncardiovascular events, highlighting the need for comprehensive prevention strategies to accommodate the changing epidemiology of MI.

A cohort study by TH Diamond [21] on 51 men aged 60 years or more who presented to a tertiary care centre with proximal femur fractures in 1995, recruited retrospectively from medical records and evaluated prospectively at six and 12 months after fracture. The study showed the median age of the 51 men was 80 years (interquartile range, 74-86 years); four were aged under 70 years. Outcome assessment was

possible for 41 men (80%). Similar proportions of men and women came from institutions (32% v. 28%), and similar additional proportions required institutionalisation after discharge (18% v. 14%). Fracture-related complications affected similar proportions of men and women (30% v. 32%), and mean length of hospital stay was similar. Fourteen per cent of men died in hospital compared with only 6% of women (P = 0.06). Men had more risk factors for osteoporosis. Physical functioning (measured by the Barthel index) deteriorated significantly in men from 14.9 at baseline to 13.4 at six months and 12.4 at 12 months after fracture. Compared with women, elderly men presenting with proximal femur fracture had higher mortality and had more risk factors for osteoporosis. Like women with proximal femur fracture, men were usually fragile, with pre-existing medical illness and fracture-related complications contributing to their overall poor outcomes.

6.3 AIMS AND OBJECTIVES

- To assess the outcome of fracture in patients with cardiac conditions.
- To evaluate delay in surgery due to cardiac medication or any other cause.
- To study quality of life post hospital discharge.

7.0 MATERIALS AND METHODS

The purpose of our study is to review and analyse the functional outcome of proximal femur fractures in patient with cardiac conditions. A prospective review of the medical records of 30 cases who will undergo surgery at Dayanand Medical college Hospital, Ludhiana will be performed.

7.1 SOURCE OF DATA

Patients in Department of Orthopaedics in teaching hospital attached to Dayanand Medical College & Hospital, Ludhiana who have given valid informed consent to take part in the study.

7.2 METHOD OF COLLECTION OF DATA

A. Methodology and type of data collected:

After obtaining clearance and approval from the institutional ethical committee, patients fulfilling the inclusion / exclusion criteria will be included in the study after obtaining informed consent.

Detailed history will be obtained using study performa with special attention to the outcome of surgery, cause of delay in surgery , time to mobilize the patient, union of fracture, number of days increased during hospital stay due to cardiac issues, examination of other associated symptoms will be based on history and physical examination.

Collection of data of patients presenting with proximal femur fracture are as follows.

- History
- Clinical examination both systemic and local.
- Radiological examination using X-RAYS and ECG, ECHO other imaging modalities if necessary.
- Diagnosis- Clinical and radiological.
- Surgery-intra medullary implant insertion
- cardiac medication
- Post operative outcome evaluation by clinical examination and X ray hip with thigh (AP view, lateral view)

Assessment of complications.

- **Perioperative** –difficulty in reduction, hypotension, shock, haemorrhage, nerve injury, vascular injury, inability to reduce the fracture site , cardiac events
- **Immediate post-operative** –Acute Renal Failure (ARF), pulmonary embolism, fat embolism, cardiovascular compromise (MI, ACS), infection, loss of reduction, DVT , myocardial infarction
- **Late post-operative** -infection, nonunion, malunion, failed fixation, metal work failure

Clinical follow-up will be done at 4-6 weeks, 3-4 months interval to assess

- mobilization
- Severity of pain
- Healing of fracture
- Functional status of surgery
- Back to normal routine or bed ridden
- Survival-ship
- Radiological follow up by X-ray will be done to assess the reduction and healing status of the hip.

B. Inclusion Criteria:

1. Proximal femur fracture
2. Cardiac condition
4. Patients who give informed consent and willing for follow up

Exclusion Criteria:

1. Pregnant patients
2. Open fractures
3. Patients managed with hip replacement
4. Patients without cardiac condition

Place of study: Inpatients in Department of Orthopaedics in teaching hospital attached to Dayanand Medical College & Hospital, Ludhiana.

Number of cases: 30 cases

Outcome: Final outcome at 3-4 months follow up using modified Harris Hip score.

Statistical Analysis: Data will be described in terms of range; mean ±standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

- Investigations – Routine and others if required.
- Radiological examination using X rayand other imaging modalities if necessary.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Yes

LIST OF REFERENCES

1. Lizaur-Utrilla A, Serna-Berna R, Lopez-Prats FA, Gil-Guillen V. Early rehospitalization after hip fracture in elderly patients: risk factors and prognosis. Archives of orthopaedic and trauma surgery. 2015;135:1663-7.
2. Patel KV, Brennan KL, Brennan ML, Jupiter DC, Shar A, Davis ML. Association of a modified frailty index with mortality after femoral neck fracture in patients aged 60 years and older. Clinical Orthopaedics and Related Research®. 2014;472:1010-7.
3. Guerra MT, Giglio L, Morais JM, Labatut G, Feijó MC, Kayser CE. The Relationship between the Lee Score and Postoperative Mortality in Patients with Proximal Femur Fractures. Revista Brasileira de Ortopedia. 2019;54:387-91.
4. Erickson BJ, Nwachukwu BU, Kiriakopoulos E, Frank RM, Levine B, Villarroel L, et al. In-hospital mortality risk for femoral neck fractures among patients receiving Medicare. Orthopedics. 2015;38:e593-6.
5. Miller CP, Buerba RA, Leslie MP. Preoperative factors and early complications associated with hemiarthroplasty and total hip arthroplasty for displaced femoral neck fractures. Geriatric orthopaedic surgery & rehabilitation. 2014;5:73-81.
6. Maceroli MA, Nikkel LE, Mahmood B, Elfar JC. Operative mortality after arthroplasty for femoral neck fracture and hospital volume. Geriatric orthopaedic surgery & rehabilitation. 2015;6:239-45.
7. Saygi B, Ozkan K, Eceviz E, Tetik C, Sen C. Skin traction and placebo effect in the preoperative pain control of patients with collum and intertrochanteric femur fractures. Bulletin of the NYU hospital for joint diseases. 2010;68:15-17.
8. Sennerby U, Melhus H, Gedeborg R, Byberg L, Garmo H, Ahlbom A, et al. Cardiovascular diseases and risk of hip fracture. Jama. 2009;302:1666-73.
9. Guilley E, Chevalley T, Herrmann F, Baccino D, Hoffmeyer P, Rapin CH, et al. Reversal of the hip fracture seoular trend is related to a decrease in the incidence in institution-dwelling elderly women. Osteoporosis International. 2008;19:1741-7.

10. Ausset S, Minville V, Marquis C, Fourcade O, Rosencher N, Benhamou D, et al. Postoperative myocardial damages after hip fracture repair are frequent and associated with a poor cardiac outcome: a three-hospital study. Age and ageing. 2009;38:473-6.
11. Chong CP, Lam QT, Ryan JE, Sinnappu RN, Lim WK. Incidence of post-operative troponin I rises and 1-year mortality after emergency orthopaedic surgery in older patients. Age and ageing. 2008;38:168-74.
12. Heyburn G, McBrien ME. Pre-operative echocardiography for hip fractures: time to make it a standard of care. Anaesthesia. 2012;67:1189-93.
13. Canty DJ, Royse CF, Kilpatrick D, Bowyer A, Royse AG. The impact on cardiac diagnosis and mortality of focused transthoracic echocardiography in hip fracture surgery patients with increased risk of cardiac disease: a retrospective cohort study. Anaesthesia. 2012;67:1202-9.
14. Marcantonio A, Steen B, Kain M, PAC KJ, Tilzey JF, Iorio R. The clinical and economic impact of preoperative transthoracic echocardiography in elderly patients with hip fractures. Bulletin of the NYU Hospital for Joint Diseases. 2015;73:239-42.
15. Luttrell K, Nana A. Effect of preoperative transthoracic echocardiogram on mortality and surgical timing in elderly adults with hip fracture. Journal of the American Geriatrics Society. 2015;63:2505-9.
16. Leibowitz D, Rivkin G, Schiffman J, Rott D, Weiss AT, Mattan Y, et al. Effect of severe aortic stenosis on the outcome in elderly patients undergoing repair of hip fracture. Gerontology. 2009;55:303-6.
17. McBrien ME, Heyburn G, Stevenson M, McDonald S, Johnston NJ, Elliott JR, et al. Previously undiagnosed aortic stenosis revealed by auscultation in the hip fracture population–echocardiographic findings, management and outcome. Anaesthesia. 2009;64:863-70.

18. Zuckerman JD. Hip fracture. New England journal of medicine. 1996;334:1519-25.
19. Komarasamy B, Forster MC, Esler CN, Harper WM, Hall AP. Mortality following hip fracture surgery in patients with recent myocardial infarction. The Annals of The Royal College of Surgeons of England. 2007;89:521-5.
20. Gerber Y, Melton III LJ, Weston SA, Roger VL. Association between myocardial infarction and fractures: an emerging phenomenon. Circulation. 2011;124:297-303.
21. Diamond TH, Thornley SW, Sekel R, Smerdely P. Hip fracture in elderly men: prognostic factors and outcomes. Medical Journal of Australia. 1997;167:412-5.

PROFORMA

S.NO. NAME: AGE:

SEX: ADM No: MRD No:

ADDRESS:

OCCUPATION:

DATE OF INJURY:

MODE OF INJURY: TRIVIAL TRAUMA (FALL)/FALL FROM MODERATE HEIGHT/RTA

DATE OF ADMISSION:

DATE OF DISCHARGE:

DATE OF OPERATION/PROCEDURE:

OPERATION: DELAYED /NOT DELAYED

TIME PERIOD FOR DELAY IN OPERATION:

CAUSE OF DELAY IN OPERATION:

CO-MORBITIES:

ISCHAEMIC HEART DISEASE:

- OLD MI
- +TMT
- POST ANGIOPLASTY
- POST CABG
- PATIENT WITH LV DYSFUNCTION (DECREASED EJECTION FRACTION)

ANTI-PLATELET AGENTS: TAKEN/ NOT TAKEN

HOSPITAL STAY: PROLONGED/ NOT PROLONGED

Signature of candidate **Signature of supervisor**

GENERAL PHYSICAL EXAMINATION:

PULSE: RR: TEMPERATURE: BLOOD PRESSURE:

ECG CHANGES:

ECHO:

POST ADMISSIONEMPLOYMENT STATUS – WORKING/NOT WORKING

BOYD AND GRIFFIN CLASSIFICATION:

- TYPE I
- TYPE II
- TYPE III
- TYPE IV

LOCAL EXAMIN ATION

- MOVEMENT AT HIP JOINT :
- ATTITUDE OF LIMB:
- SWELLING AROUND PROXIMAL THIGH YES/NO:
- SKIN CHANGES:
- LIMB SHORTENING :

OPERATION/PROCEDURE:

Signature of candidate **Signature of supervisor**

COMPLICATIONS :

- **PERIOPERATIVE** –DIFFICULTY IN REDUCTION, HYPOTENSION, SHOCK, HAEMORRHAGE, NERVE INJURY, VASCULAR INJURY, INABILITY TO REDUCE THE FRACTURE SITE , CARDIAC EVENTS AND OTHERS
- **IMMEDIATE POST-OPERATIVE** – ACUTE RENAL FAILURE (ARF), PULMONARY EMBOLISM, FAT EMBOLISM, CARDIOVASCULAR COMPROMISE (MI, ACS), INFECTION, LOSS OF REDUCTION, DVT, MY-OCARDIAL INFARCTION AND OTHERS
- **LATE POST-OPERATIVE** -INFECTION, NONUNION, MALUNION, FAILED FIXATION, METAL WORK FAILURE AND OTHERS

FOLLOW UP:

RADIOLOGICAL XRAY: UNION/ NON UNION

4-6 WEEKS	3-4 MONTHS

Signature of candidate **Signature of supervisor**

MODIFIED HARRIS HIP SCORE:-

Variable	Points
Pain	
None or ignores it	44
Slight, occasional	40
Mild pain, rarely moderate	30
Moderate pain	20
Marked pain	10
Totally disabled, pain in bed	0
Function	
Limp	
None	11
Slight	8
Moderate	5
Severe	0
Support	
None	11
Cane, long walks	7
Cane, most of the time	5
One crutch	3
Two canes	2
Two crutches	0
Not able to walk	0
Distance walked	
Unlimited	11
Six blocks	8
Two to three blocks	5
Indoors only	2
Bed and chair	0
Stairs	
Normally without railing	4
Normally with railing	2
In any manner	1
Unable to do	0
Shoes and socks	
With ease	4
With difficulty	2
Unable	0
Sitting	
Ordinary chair for 1 h	5
High chair for 1 h	3
Unable to sit in any chair	0
Public transport	
Able to use	1
Unable to use	0

Signature of candidate **Signature of supervisor**

PARAMETERS	4-6 WEEKS	3-4MONTHS
PAIN		
LIMP		
SUPPORT		
DISTANCE WALKED		
STAIRS		
SHOES AND SHOCKS		
SITTING		
PUBLIC TRANSPORT		
TOTAL SCORE		

HARRIS HIP SCORING SYSTEM:

TOTAL FUNCTIONAL OUTCOME WAS GRADED AS FOLLOWING DEPENDING ON THE TOTAL HARRIS HIP

POOR: HARRIS HIP SCORE LESS THAN 70.

FAIR: HARRIS HIP SCORE BETWEEN 71-80.

GOOD: HARRIS HIP SCORE BETWEEN 81-90

EXCELLENT: HARRIS HIP SCORE BETWEEN 91-100

Signature of candidate **Signature of supervisor**

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o.....
.....am willing to participate in the study **"OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

Name:

.....
Signature of the patient

Signature of Candidate

Signature of Supervisor

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____ _____

गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"OUTCOME IN PATIENTS WITH PROXIMAL FEMUR FRACTURE WITH CARDIAC CONDITIONS" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____ _____

ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____ ਮਿਤੀ_____

ਪਤਾ _____ ਪਤਾ _____

_____

ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____

ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ